

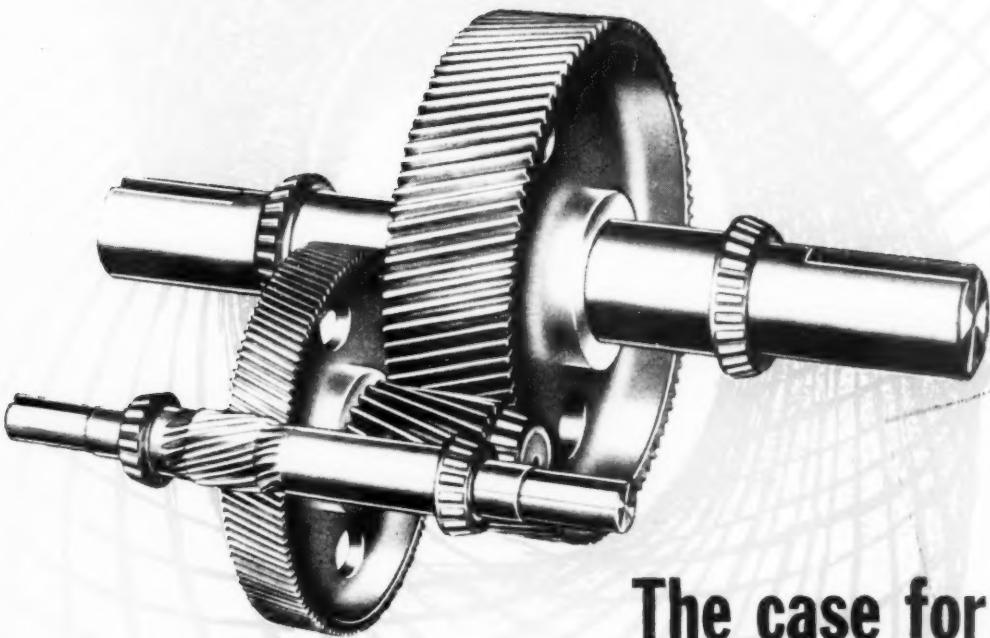
POWER TRANSMISSION DESIGN

SERIES ON GEARMOTORS

- PART 2

OEM · MAINTENANCE

FEBRUARY 1960



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The case for
HONED GEARS
...less noise...lower cost



THE MAGAZINE OF MACHINE DRIVES

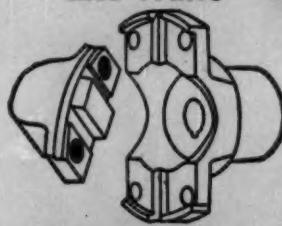
*News and ideas for designers and plant engineers
who use power drive equipment*

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LESS PARTS



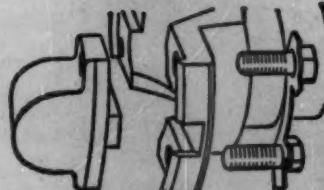
LESS WEIGHT



DRIVE

KEY

QUICKER

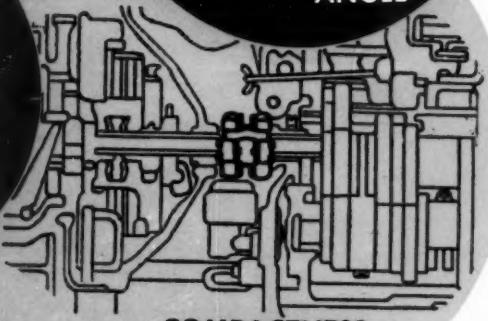


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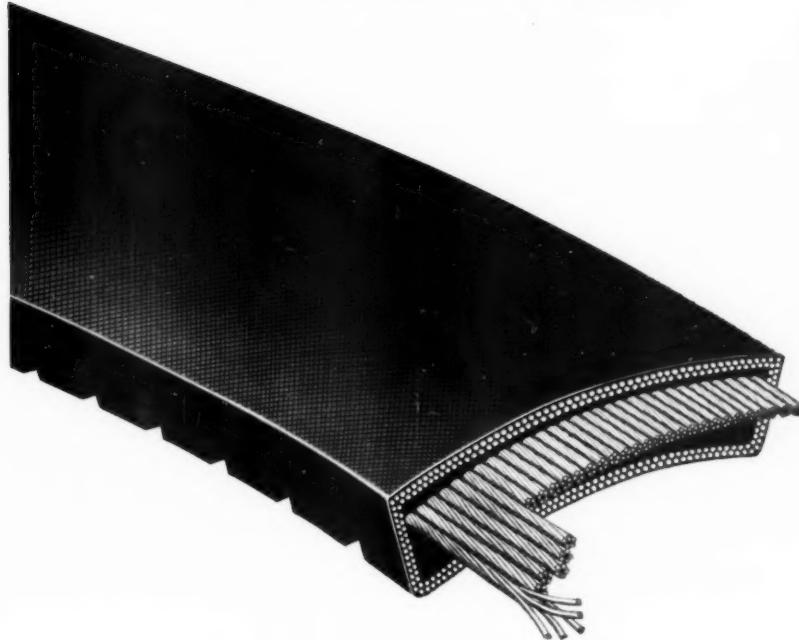
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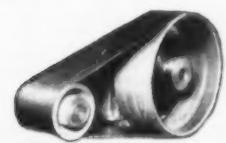
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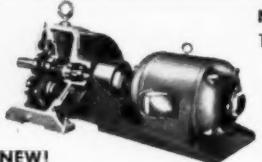
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NEW!
Jones All-Motor Type Gearmotors



NEW! Jones Integral Type Gearmotors

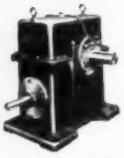
Designed with high-hardness gearing for longer life. One-piece low speed end housing construction insures gear alignment and prevents oil leakage. Compact design. All three types available for foot-mounted or flange-mounted installation, and for horizontal or vertical application. Capacity is up to 250 hp.

NEW! Jones In-Line Helical Reducers



Jones Herringbone Gear Reducers

Accepted throughout industry; balanced design, heavy-duty roller bearings, rugged cast iron housing for reliable service and low maintenance costs. The most complete parallel shaft line in industry.



Jones Worm Gear Reducers

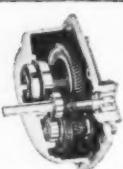
Horizontal and vertical shaft types available with ratios to 80:1. Heavy-duty roller bearings throughout with high-test cast iron housings for positive gear alignment.



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For vertical output shaft service; ratios from 25.63:1 to 357.5:1. Provide optimum combination of initial cost, efficiency, and low maintenance. Proven in hundreds of installations; redesigned to incorporate latest improvements in metallurgy and reducer design.

Now!



NEW! Jones Shaft-Mounted Reducers

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POWER TRANSMISSION DESIGN

Jones Speed Reducers for every purpose

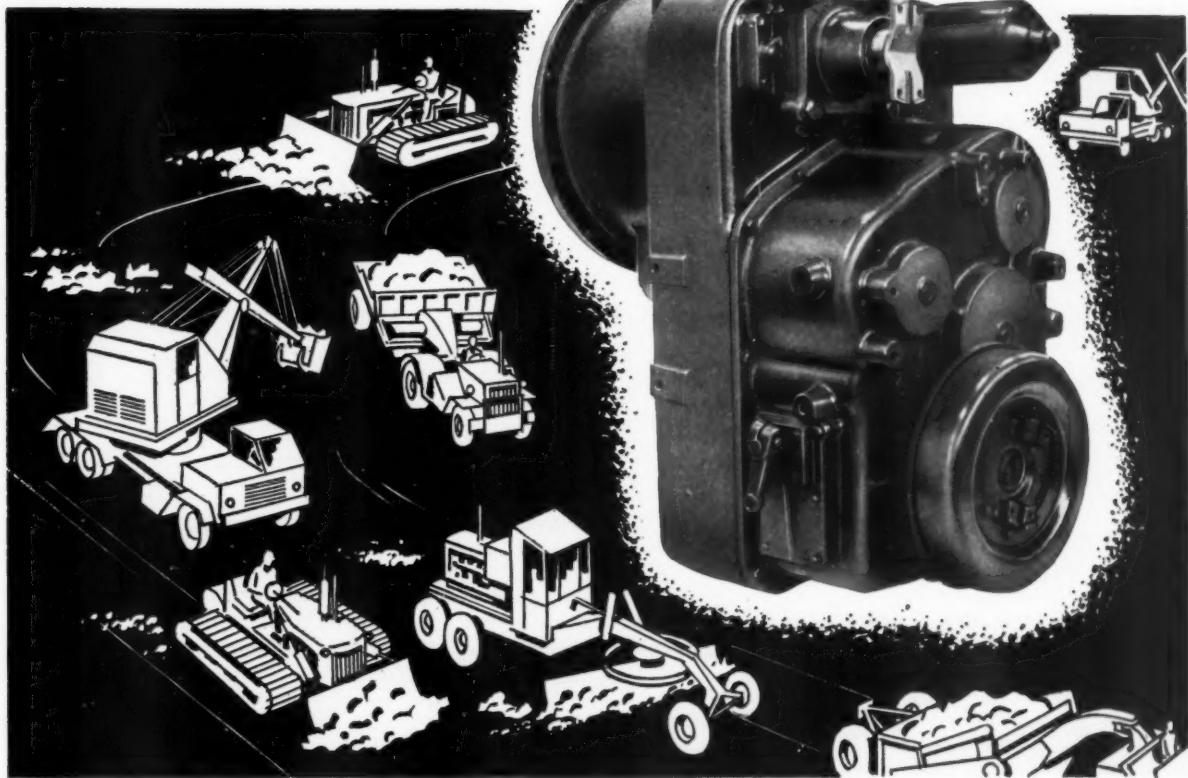
One of the most comprehensive speed reducer lines in industry! With new shaft-mounted reducers, in-line helical reducers, and gearmotors, Jones now offers a wide selection for all your power transmission needs. New technical literature gives you exactly the information you need for proper selection of units in accordance with latest A.G.M.A. ratings. Be sure to ask your Jones representative for copies, or write Hewitt-Robins, Stamford, Connecticut. Ask for Bulletin 2-22.



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INDUSTRIAL HOSE ... VIBRATING CONVEYORS, SCREENS & SHAKEOUTS

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A torque converter...and 4-speed transmission in one compact package!

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Simple to operate, too, a flip of the operator's lever accomplishes power shifts within each range and without any interruption of the power flow.

With four speeds forward and reverse, the CDB Hydra-Drives Power Shift Transmission is ideally suited for vehicles which must travel in both directions during a normal work cycle. Rated at 550 ft. lbs. input torque, it can be used with a wide range of internal combustion engines up to 250 H.P.

The CDB model illustrated above is used in connection with a size "C" drop box. A BDB model is also available, for use with a size "B" drop box on equipment of up to 175 H.P.



Products of ROCKWELL-STANDARD Corporation

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FEBRUARY 1960

volume 2 number 2

POWER TRANSMISSION DESIGN

THE MAGAZINE OF MACHINE DRIVERS



®

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For highly compact, plus-power drives. First major design change in Multiple V-Belts in the last 30 years.



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Combines the advantages of the chain and gear with all of the advantages of the belt. No stretch, no metal to metal contact, no constant lubrication.

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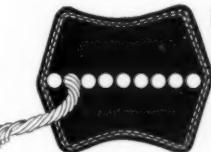
STEEL CABLE V-BELTS

Steel cable permits no-stretch installation. All belts are fluoroscoped to assure extra high quality.



RAILROAD BELTING

High tensile strength, low stretch belting features high fastener tear-out resistance.



DOUBLE V-BELTS

Relieved cross section assures maximum flex resistance. New control methods provide uniform cord section.

OPEN END V-BELTING

Used on drives where endless V-Belts are not practical. High fastener tear-out resistance.



Red Shield Belts now offer 40 per cent extra capacity. Iso Dynamic matching and cord stability assure precise balance and long belt life. Also available in oil and heat resistant and static dissipating constructions.



RED SHIELD MULTIPLE V-BELTS

VARIABLE SPEED BELTS



Abrasion resistant cover assures maximum life. Crowned cross section maintains stability under extreme loads.

Test . . . Compare . . . You'll Select

DURKEE-ATWOOD V-BELTS

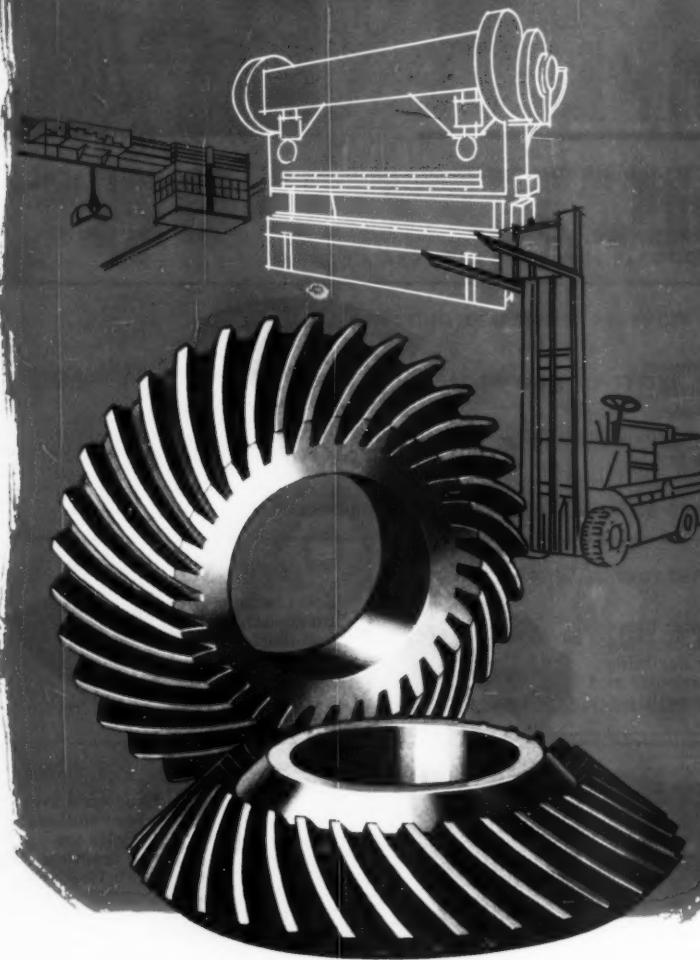
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LETTERS

Address letters to:
The Editor
Power Transmission Design
812 Huron Road, Cleveland 15, Ohio

Need finer comb

Gentlemen:

The article on roller chain life in your November issue gives the strong impression that roller chains do not need lubrication. As a matter of fact, as I read through the article, I still cannot figure out whether the problem was wear or fatigue breakage. The first paragraph implies that the chain was wearing out and the rest of the article suddenly switches and leads the reader to believe that it was not wear after all, but fatigue breakage. It sounds as though the problem was solved with a tensioning idler rather than by avoiding lubrication, contrary to what the heading of the article says.

I am planning to continue to read your magazine nevertheless, but hope that you comb the articles over a little finer before you print them.

JOHN J. SCALES
Division Application Engineer
Chain Belt Co., Rex Roller Chain Div.,
Springfield, Mass.

Apparently the comb we used on the article had a few teeth missing.

Reprints

Gentlemen:

Recently you published a series of articles on "Bearings—their Design and Application" in three successive issues of POWER TRANSMISSION DESIGN.

We have found these articles very interesting and informative and would appreciate receiving 25 additional reprints so that they can be distributed for use by our designers.

JAMES P. BLAIR
Assistant to the Vice President
In Charge of Engineering
Heyl & Patterson, Inc.
Pittsburgh, Pa.



Twin Disc CL Heavy-Duty Clutch — the clutch with the built-in safety factor

Throughout the world design engineers have come to rely on Twin Disc Model CL Clutches for economical, trouble-free performance in a wide range of power train applications. Model CL's reputation for durability in severe service is due in large part to conservative work capacity ratings. There are ten standard CL sizes (5½" to 11½") for transmitting loads from 1.9 to 19.3 hp per 100 rpm; all are rated with an ample safety factor to take shock loads without distress.

All surfaces are of high strength cast iron, yet overall dimensions are held to a minimum to save space in machine installations. Cover enclosure permits operation in the open without housings or guards. Adjustments are made from the outside — no tools necessary.

Model CL is available with one, two or three drive plates. Where the

clutch is engaged frequently, the single-plate design is recommended. Two- and three-plate clutches double and triple torque capacity within the same diameter. Choice of standard gear tooth driving ring or driving spider assembly. Throw-out yoke, hand lever and operating shaft optional.

Specify CL Clutches for easier control, longer wear life, less maintenance. Remember, too, that Twin Disc Clutches are backed by an unparalleled parts and service program.

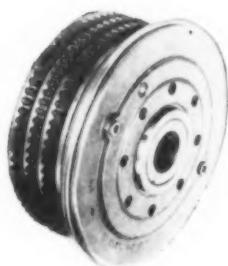


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on the drives you want**



**Twin Disc
HYDRO-SHEAVE® Drive**

A complete fluid drive package for immediate application to motors and engines from ¾ to 50 hp. Provides smooth operation, prevents stalls and shock load damage, permits motor selection on a running load basis. Designed for use with standard QD sheave, can be installed in five minutes. Other fluid couplings available in sizes through 27" for capacities to 850 hp.



**Twin Disc
PO Air Clutches**

Similar to CL Clutches except for air-actuation feature. Designed for remote control without complex linkages where compressed air source of 60 to 130 psi is available. Self-compensating for wear — never need adjusting. Cartridge-type diaphragm positively prevents air leakage. Sizes from 8" to 36" with one, two or three drive plates.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

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FEBRUARY, 1960

NEWS from the power transmission field

Form new company

DAYTON, OHIO—A new joint company—Dayton Rubber International—has been formed by the Dayton Rubber Co. and N. V. Vereenigde Nederlandse Rubberfabrieken (Hevea) to sell V-belts and other industrial and automotive rubber products in Europe's common market. Hevea has been licensed to make Dayton Rubber's line of products for sale in the common market. They will carry the Dayton-Hevea label.

New highspeed camera has fluid clutch

BETHLEHEM, PA.—A patent has been issued to Ivan J. Taylor, instruments associate in Lehigh University's Fritz Engineering Laboratory, for a high-speed camera in which a magnetic fluid clutch is used to obtain film speeds of 35 fps in less than 1/10 second. The camera reaches maximum speed after only one foot of film is used.

Brakeshoe acquires two European firms

GENEVA, SWITZERLAND—Brakeshoe International, S. A., Swiss subsidiary of American Brake Shoe Co., has acquired industrial hydraulics firms in Belgium and England. The Belgian acquisition is Hydrobel, S. A., which designs and installs industrial hydraulic and pneumatic systems; the English firm is Deri (Engineers) Ltd., which produces industrial hydraulic pumps and motors.

Waltham adds motors

WALTHAM, MASS.—The Waltham Precision Instrument Co. has purchased the Electric Motor Div. of the Advanced Products Co. Acquisition of the new facility, which will be moved to Waltham, adds a complementary product line of subminiature synchronous motors to the company's list of components.

Dallas firm holds transmission show

DALLAS, TEX.—To celebrate the opening of its new offices and warehouse, the Geo. J. Fix Co., 1901 S. Good-Latimer Expressway, held a "power transmission exposition" last month. The company, distributors of power transmission equipment, set up a number of displays featuring the products of the manufacturers it represents.

Special gear box offered in new Chrysler 300F

DETROIT, MICH.—An imported French Pont-a-Mousson manual four-forward-speed synchro-mesh gear box and a 400 hp ram manifold high performance engine are available as optional equipment on the new Chrysler 300F. Standard engine in the 300F, a sports-type touring car, is a 375 hp ram manifold V-eight, equipped with pushbutton Torque Flite three-speed automatic transmission.

Ram induction, like a supercharger, literally rams air and fuel into the engine when the throttle is opened. However, it doesn't "steal" power from the engine for its operation, and has no moving parts to get

Cullman Wheel opens southern warehouse

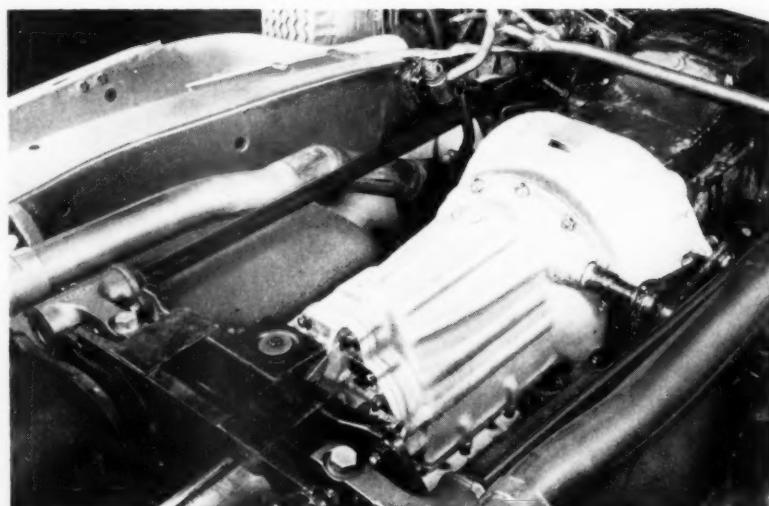
CHICAGO, ILL.—For faster delivery of roller chains and sprockets in the Southeast, Cullman Wheel Co. has opened a factory warehouse in Tampa, Fla. It's located at 205 North 11th St., and the manager is Julian Kessler.

Mayor heads NLGI

KANSAS CITY, Mo.—H. A. Mayor, Jr., has been elected president of the National Lubricating Grease Institute, succeeding F. E. Rosenstiehl. Mayor was elected to the NLGI board of directors in 1953, and was vice president and head of the annual meeting during the 1958-59 administration.

out of adjustment. Ram induction is said to provide torque increase of as much as 10% in the 1800 to 3600 rpm range, compared with engines equipped with the single four-barrel carburetor Golden Lion Chrysler engine.

The gear ratios on the manual Pont-a-Mousson transmission are: first, 3.35; second, 1.96; third, 1.36; fourth, 1.00; reverse, 3.11. On the standard automatic transmission, the maximum overall torque multiplication is 5.39. First gear ratio is 2.45, second is 1.45. Standard rear axle ratios of both manual and automatic are 3.31.



PONT-a-MOUSSON manual four-forward-speed synchro-mesh gear box.

Fafnir buys Fischer

NEW BRITAIN, CONN.—Fafnir Bearing Co. has purchased all assets and business of the Fischer Bearings Co. Ltd., one of Timken Roller Bearing Co.'s British subsidiaries. Fischer is the fourth largest bearing manufacturer in England, and its products will be marketed under the Fafnir name. Stanley M. Cooper, chairman of the Fafnir board of directors, becomes chairman and managing director of Fafnir of England.

New Aetna office

CHICAGO, ILL.—Aetna Ball & Roller Bearing Co. has opened Detroit sales offices at 14631 W. McNichols, in the Executive Bldg. District sales manager is Howard F. Wolfe, formerly with S. T. Keller Co., which had represented Aetna in the Michigan area.

Offers translations of Russian patents

LONDON, ENGLAND—English abstracts of Russian patents are available in *Russian Patents Gazette*, published by Technical Information Co., Chancery House, Chancery Lane, London, W.C.2, England.

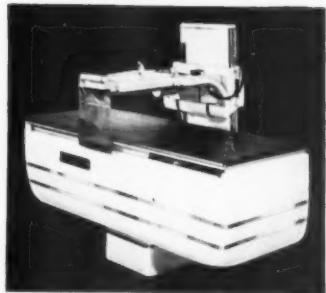
Miniature bearing firm opens Western center

LOS ANGELES, CALIF.—Miniature Precision Bearings, Inc., has opened a Western Technical Center and sales office to provide expanded engineering services in the West. The Center has a fully-equipped bearing test and evaluation laboratory, air-conditioned to filter out particles larger than .3 microns. Harry E. Gabriel, newly-appointed Western manager, heads the Center. Robert R. Pierson has charge of the laboratory, and Raymond G. Sparks and Earle Olson are sales engineers in the area.

Christensen is NMTA president

CINCINNATI, OHIO—Paul W. Christensen, Jr., president of The Cincinnati Gear Co., was elected president of the National Metal Trades Association at its recent annual meeting. Long active in the association, he formerly was its treasurer.

Winsmith speed reducers specified for Westinghouse Fluoradex X-ray tables . . .



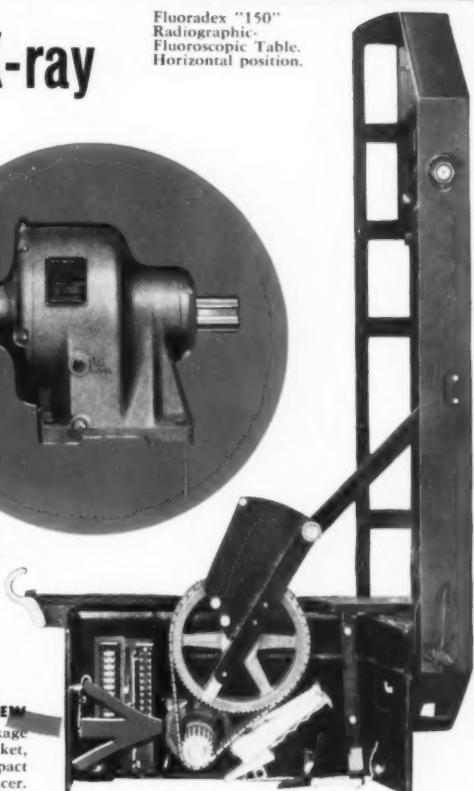
Fluoradex "150"
Radiographic-
Fluoroscopic Table.
Horizontal position.



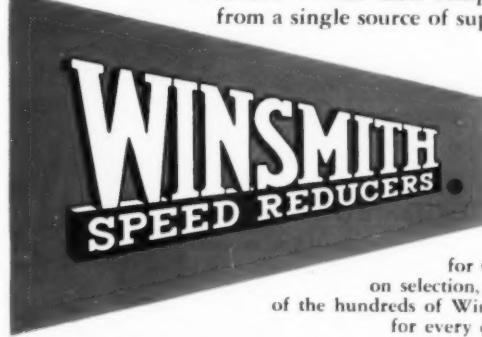
SELECTION BASED ON

- Compactness
- Efficiency
- Quiet Operation

TABLE BASE, REAR VIEW
Table is tilted by precision linkage
mounted on a multiple sprocket,
chain-driven through a compact
Winsmith Differential Reducer.



Fluoradex Radiographic-Fluoroscopic Tables are precision instruments of high strength and flexibility, combined with safe, quiet operation. For table tilt motion in keeping with this high-quality design, Westinghouse specified a Winsmith Differential Reducer with 108:1 reduction. Reasons for the Westinghouse choice of Winsmith—compact design, efficiency and quiet operation—are the same reasons so many other leading manufacturers also specify "Winsmith" . . . the most complete line of speed reducers from a single source of supply.



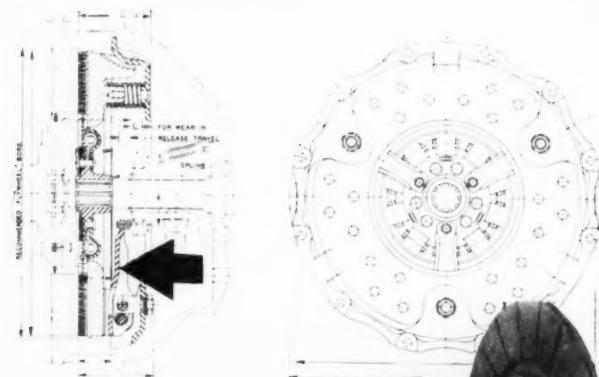
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on selection, operation and maintenance
of the hundreds of Winsmith types and sizes
for every drive application.

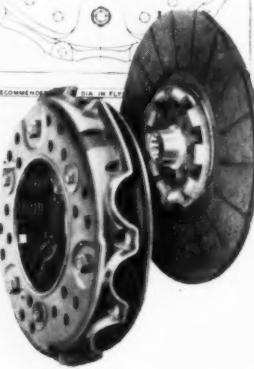


WINSMITH, INC. 28 Sixth Street, Springville, (Erie County), N.Y.
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ROCKFORD



Precision Built For Better QUALITY



ROCKFORD Precise Workmanship provides clutch levers that reduce friction, improve release action and prevent lever throw-out. These wear-resisting, life-lengthening clutch features are covered by patents and are essential to designs that must be projected with a thought to uses of tomorrow. ROCKFORD CLUTCHES provide the advantages of heat-treated, hardened and ground steels—flat, non-grab facings—heat dissipation—dirt exclusion—and fine accurate adjustments. ROCKFORD engineers now are working with many companies on their future designs—to provide custom-engineered clutches for long range economy. Their services are available to you at your convenience.

SEND FOR THIS HANDY BULLETIN

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD Clutch Division BORG-WARNER

1331 Eighteenth Ave., Rockford, Ill., U.S.A.

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CLUTCHES

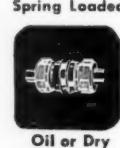
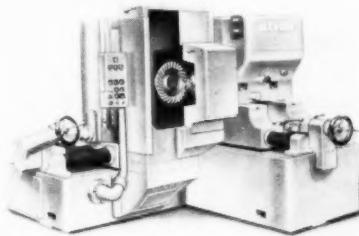
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10

NEWS *continued*

New hypoid tester

ROCHESTER, N. Y.—Gleason Works has developed a new variable speed bevel and hypoid gear test machine to test gears up to 36-in. diameter, any shaft angle from 10° to 130°. In addition to testing for location of tooth bearing area, the tester can check for quiet operation at any speed from 200 to 2000 rpm, and during acceleration and deceleration.



The gear pair is mounted in the machine with the proper backlash, and run together under a light brake load for a noise test. A marking compound, applied before the test, shows the tooth bearing areas after the gears are stopped. The operator can then place the bearing in the proper position and determine what corrections are necessary on the gear cutting equipment.

Gears also can be run together without backlash. A light spring tension holds the gears in metal-to-metal contact, and a dial indicator shows the composite error in runout and tooth spacing.

Dean Hill Pump changes name

INDIANAPOLIS, IND.—Dean Hill Pump Co., Inc., has changed its name to Dean Hill Corp. The firm, founded in 1890 as the Hill Machine Works, produces centrifugal pumps and mechanical drive steam turbines.

I-T-E appoints agent

FLOURTOWN, Pa.—John C. McClelland, Cricket Rd., is now a sales agent for the complete line of Electro Clutches made by I-T-E Circuit Breaker Co. His territory includes Delaware, eastern Pennsylvania, and southern New Jersey. McClelland also handles a wide range of other components and equipment for power transmission.



POWER TRANSMISSION DESIGN

here's the
really new
Cleveland Worm
and Gear
**SPEED
REDUCER**



It was Designed to Provide: High Horsepower in a Smaller Unit • Centrifugally Cast Bronze Gears • Alloy Steel Worms Heat Treated By An Exclusive Process for Carrying Higher Loads • Fan Cooling for More Efficient Operation • Maximum Overhung Load-Carrying Capacity • Ribbed Housing for Maximum Strength and Heat Dissipation • Modern, Streamlined Design to Enhance Your Machine's Appearance.

Cleveland's new speed reducer line meets AGMA Standard 440.03 — which permits higher horsepower and torque ratings — provides you speed reduction at savings of 50% or more on cost per horsepower. All this, with no deviation from Cleveland's standards of quality and dependability.

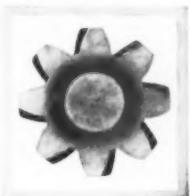
Remember, this strikingly new line of fan-cooled reducers — now available from one to forty horsepower — incorporates all the design knowledge gained by Cleveland's engineers over the past 47 years — plus all the advantages of modern metallurgical techniques and advanced manufacturing processes. Consult your Cleveland Representative for the complete story on this new speed reducer — or write us direct for Bulletin No. 405. It details input horsepower and output torque ratings, service factors, application and load classifications, as well as general over-all dimensions. The Cleveland Worm & Gear Company, 3273 East 80th Street, Cleveland 4, Ohio.

A subsidiary of
Eaton Manufacturing Company
Affiliate: The Farval Corporation



Check these new exclusive Cleveland features

Cleveland's Worm's, heat-treated by an exclusive process, possess a high degree of hardness throughout their entire thread thickness — and well below the worm's root diameter. This gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.



Centrifugal cast bronze rims have a greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. They are centrifugally cast integral with cast iron centers on 6" and smaller sizes. This permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.



Worm and gear shaft bearings are Timken taper roller type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in the housing bore for greater rigidity.



CLEVELAND
Worm Gear
Speed Reducers

Circle No. 13 on Reader Service Card



PRECISION
ELECTRONIC
ADJUSTABLE-SPEED
DRIVES

- **SPEED RANGE** Infinitely adjustable from less than 36 rpm to more than 3600 rpm while delivering full rated torque. Continuous duty rating at all speeds.
- **REGULATION** Both line and load regulation is better than $\frac{1}{2}$ of 1% of rated speed.
- **HORSEPOWER** Various models from $\frac{1}{4}$ hp down to 1/200 hp. Motors of $\frac{1}{4}$ hp and larger are totally enclosed.
- **REMOTE CONTROL** A 10-turn potentiometer provides precise adjustment at any convenient location.
- **GEARED MOTORS** Motors are available with integral gear reducers.
- **BRAKING-REVERSING** Relay-controlled braking and reversing models available.
- **MAINTENANCE** Fully encapsulated construction results in long service life. Plug-in construction requires only a screwdriver for servicing.
- **OTHER MODELS** Servo-Tek manufactures drives with silicon rectifiers and adjustable autotransformers, as well as other thyatron drives with less exacting specifications. Write for information including details of your proposed use.

IMMEDIATE DELIVERY



Circle No. 42 on Reader Service Card

12

MEN of the power transmission field

Manheim's Alexander named vice president

MANHEIM, PA.—Vincent K. Alexander has been appointed vice president of Manheim Mfg. and Belting



ALEXANDER

Co. With Manheim for 23 years, Alexander has been sales manager for the past 16 years. He'll continue to serve in that capacity.

Higgins succeeds Boos at U. S. Rubber

NEW YORK, N. Y.—Edward J. Higgins has been named general manager of the international division of U. S. Rubber Co., succeeding the late Ludwig C. Boos, who died recently. Higgins, formerly assistant general manager, will direct all manufacturing and marketing activities outside the United States and Canada.

Rockwell-Standard division promotes two

DETROIT, MICH.—These two appointments have been made at the Transmission and Axle Div., Rockwell-Standard Corp.: Kenneth M. Koch



KOCH



FLANNERY

becomes director of engineering; Gerald J. Flannery, service parts manager. Koch formerly was assistant general sales manager, while Flannery served in the division's accounting department.

Denison names consultant

COLUMBUS, OHIO—Denison Engineering Div., American Brake Shoe Co., has retained F. L. Donnally as an engineering consultant to specialize in the application of pump and control products to the marine industry.

Benson promoted at Chain Belt

MILWAUKEE, WIS.—Vernon W. Benson has been promoted to sales manager of Chain Belt Co.'s agricultural chain division at Dolton, Ill. Benson

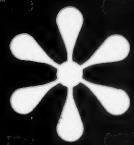


BENSON

joined the firm in 1937 and, after holding supervisory production posts in the chain and transmission division, was appointed assistant sales manager of that division in March, 1958.

Torrington appoints district engineers

TORRINGTON, CONN.—Torrington Co. has assigned four district engineers to regional sales offices: Richard Finn, Tulsa; Harvey M. Mauel, Eastchester, N. Y.; Robert F. Deacon, Pittsburgh; John W. Stout, Philadelphia.



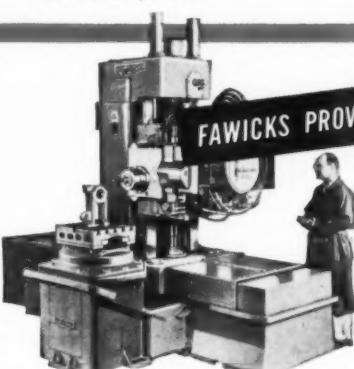
wherever high-performance
clutches and brakes are required
you'll probably find FAWICK!

FAWICKS BOOST PRODUCTION 250%



★ Airflex Clutches have provided trouble-free power transmission on fire-brick presses for nine years at Kaiser Refractories & Chemicals Division, Moss Landing, California. Simplified, drum-type design and self-adjusting action have eliminated the frequent overhauls and replacements that were necessary with the mechanical clutches previously used. Push-button operation, instant clutch response and greatly reduced press down-time have resulted in an overall production increase of 25 per cent.

FAWICKS PROVIDE FULL AUTOMATION



★ The Kearney and Trecker Milwaukee-Matic incorporates three FAWICK Magnetic Clutches in the spindle head for split-second starts, stops and reversing actions vital to its precision-timed operation. The Magnetics' instant response to automatic controls, shock-free operation and full transmission of torque contribute to a fully automated program of machining operations in which 31 tools are selected, brought to the work and changed in scheduled sequence.

For machines that demand clutch and brake action of the highest order,
specify FAWICK—best qualified to solve your power transmission problem.

Contact your nearest FAWICK representative, or the Home Office, Cleveland, Ohio.



FAWICK
AIRFLEX

INDUSTRIAL CLUTCHES AND BRAKES

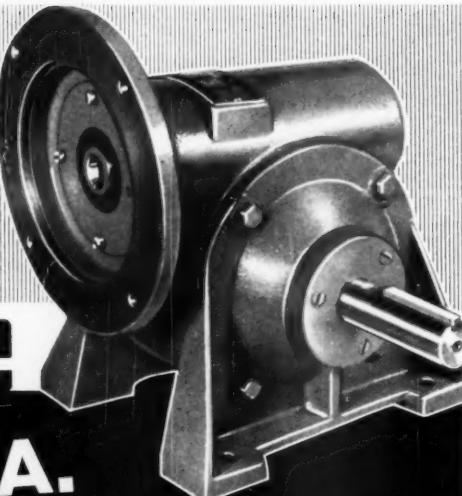
FAWICK AIRFLEX DIVISION

FAWICK CORPORATION

9919 CLINTON ROAD • CLEVELAND 11, OHIO

Fawick Canada, Ltd., 60 Front St., West, Toronto, Ont., Canada

Circle No. 19 on Reader Service Card



**Janette
N.E.M.A.
"C" FACED SPEED
REDUCER...**

*Gives you new concepts in
practicability, flexibility and availability*

PRACTICABILITY:

The "C" Faced Speed Reducer features an independent, hollow shaft, gear reduction unit used with a standard separate N.E.M.A. "C" Face Mounting Motor.

Here's real practicability—the original motor can be replaced regardless of reason; whether motor failure or to replace with a motor having different specifications in voltage, torque, etc., *without disturbing gear unit or removing unit from the installation.*

FLEXIBILITY:

Janette N.E.M.A. "C" Faced Reducers may be supplied with a Janette motor or without a motor.

This means you always have the motor of your choice.

Motor H. P. rating from $\frac{1}{8}$ to 5 H. P. and Gear Ratios from 4 to 1 up to 90 to 1 in standard models. A.G.M.A. Class II and Class III gears also available.

AVAILABILITY:

"C" Reducers are supplied from a nationwide distributor and service organization—105 distributors, 87 service stations, and Janette's 32 warehouses. This nationwide distribution means prompt efficient service to all gear-motor users regardless of where they are located.

Janette N.E.M.A. "C" Faced Speed Reducers are guaranteed by the Janette Electric Mfg. Co., designers and manufacturers of Speed Reducers and Gear-Motors for 50 Years.

Get the complete story. Call your Janette Distributor, Salesman, or write for Bulletin No. 5-250.

SINCE 1910

Janette GEAR MOTORS
MOTORS
SPEED REDUCERS

Circle No. 49 on Reader Service Card

MEN *continued*

Handles DIPCO sales in Knoxville area

MELROSE PARK, ILL.—Richard E. Gurley, Jr., has been appointed district sales manager in the Knoxville area for Dayton Industrial Products



GURLEY

Co., a division of The Dayton Rubber Co. He'll handle sales in eastern and central Tennessee. Gurley formerly was a sales engineer with Raybestos-Manhattan, Inc.

Carlyle Johnson names Michigan rep

MANCHESTER, CONN.—Carlyle Johnson Machine Co. has appointed Lawrence H. Dickelman, Detroit, exclusive sales engineer for the state of Michigan. He'll represent the Maxitorq line of electric and manual clutches and brakes.

Chain Belt fills district sales posts

MILWAUKEE, Wis.—At Chain Belt Co., Thomas C. Jewell, Jr., joins the Pittsburgh office as a district sales engineer, and Richard W. Swanborg joins the Milwaukee district office in



JEWELL



SWANBORG

the same capacity. Jewell had been assigned to Chain Belt's Appleton, Wis., area office; Swanborg had directed the firm's industrial sales training.

Noreen appointed PA at Jones Machinery

STAMFORD, CONN.—John R. Noreen has been named purchasing agent for the Jones Machinery Div., Hewitt-Robins Inc. He formerly was purchasing agent at the Cory Corp.

Merkle-Korff assigns two managerial posts

CHICAGO, ILL.—Harry D'Almaine, formerly advertising manager, has been promoted to marketing plans manager at Merkle-Korff Gear Co.



D'ALMAINE



JOYNER

Edward A. Joyner, formerly sales promotion manager of General Electric Supply Co. (Chicago district), succeeds D'Almaine as advertising manager.

Green joins Triangle

OSHKOSH, WIS.—David G. Green has joined Triangle Mfg. Co. as chief



GREEN

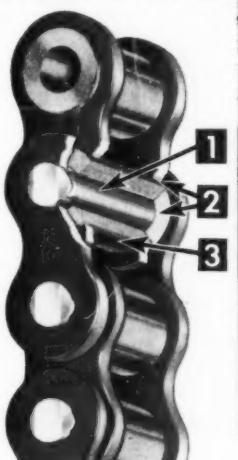
engineer. He formerly was with the Transmission and Axle Div., Rockwell-Standard Corp.

Joins Western Gear Chicago sales office

LOS ANGELES, CALIF.—Robert Geiger has been appointed a sales engineer in Western Gear Corp.'s Chicago office. He'll represent the Industrial Products Div.'s line of gearmotors, speed reducers, and high-speed units.

John Deere Found a Chain Drive That-

1. **REQUIRES NO LUBRICATION**
2. **IS SELF-CLEANING**
3. **REQUIRES NO MAINTENANCE**
4. **OUTWEARS ORDINARY CHAIN**



Critical Area 1:

PIN—Protective oil film lubricates live bearing area between pin and bushing, minimizing wear by reducing metal-to-metal contact.

Critical Area 2:

PLATES—Oil-impregnated Sintered Steel Bushings extend beyond surface of inside plates to act as lubricated thrust bearings, control clearance, and provide an oil cushion between plates, eliminating plate galling and seizing frequently caused by misalignment of sprockets.

Critical Area 3:

SPROCKET ENGAGEMENT—Oil film on MSL Bushing exterior provides constant lubrication between sprocket teeth and chain. Whitney MSL Chain requires no rollers, as the tough oil film on the bushing surface provides smooth sprocket engagement, cushions impact and reduces drive wear.

Chain drives on farm machinery take a beating. Dust, dirt, corrosion and rust— inadequate lubrication, and hit-or-miss maintenance, all add up to "stiff joints"—the major cause of chain failure.

John Deere provides owners of its 494 and 495 Planters with extra insurance against drive chain trouble by using advanced design Whitney MSL* Self-Lubricating Chain on main drives of these machines. Because John Deere engineers recognized the advantages of MSL Chain's built-in lubrication at all 3 critical chain areas, farmers aren't bothered with the usual problems encountered in equipment drives. And they get longer chain life—up to 5 times longer—than that provided by conventional chain.

If the drive chain on your product must deliver top performance in severe operating environments, or operate with maximum cleanliness, Whitney MSL Chain can do the job. Standard and Extended Pitch MSL Chain conforms fully to ASA Standards, making it completely interchangeable with any similar pitch ASA standard chain. Write for MSL Chain Catalog today.

* Maximum Service Life



CHAIN COMPANY

4575 S. Western Blvd., Chicago 9, Ill.

THE WHITNEY
a subsidiary of **FOOTE BROS.**
GEAR AND MACHINE CORPORATION

POWER TRANSMISSION DRIVES

Circle No. 44 on Reader Service Card

NEW! DUAL TORQUE-LOCKING AND POSITIONING DEVICE

REV-LOK eliminates feedback torque, provides two-directional positioning, drive, over-running and backstopping

NOW! You can have positive and instantaneous stopping of feedback (reverse) torque—it will never reach the driving equipment. For, the complement of sprags in this new Formsprag device is divided into two opposing sets that: instantly stops feedback from either direction, assures equalized radial loading, evenly distributes wear for longer life, and provides multi-contact surfaces for greater holding strength when high feedback torque occurs.

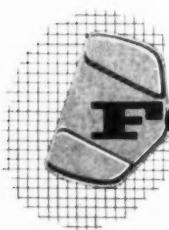
When the device is mounted with the outer race in a fixed position, feedback is stopped by wedging of sprags between output member and I.D. of fixed outer race—feedback never reaches the input shaft. Yet, this new design permits free rotation and transmission of high driving torque in either direction from input to output shaft.

When used as a two-directional over-running clutch, output shaft member is mechanically secured against rotation and outer race then becomes the output member. A slight right or left rotation of input shaft disengages either set of sprags and determines direction of drive, over-running and backstopping.

This versatile device can also be used for two-speed drive and reversing applications. By connecting a low-speed reversible motor to outer race and a high-speed motor to input shaft member, driving torque can be transmitted at two speeds or reversed.

Here is a multi-purpose device, that not only drives, positions, over-runs and backstops in two directions, but also provides automatic, instantaneous and positive prevention of feedback from driven equipment to power source. It is compact, has greater torque capacity for its size and weight and permits higher over-running speeds than any similar device. Operation and features are explained in detail in a new Formsprag technical paper, send for your free copy.

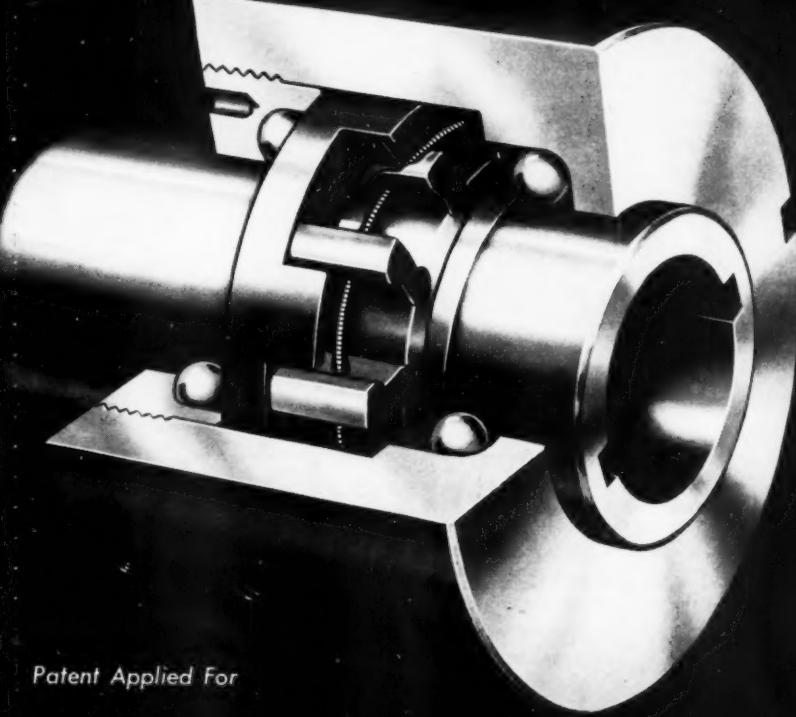
FORMSPRAG COMPANY, 23587 Hoover Road, Dept. 105, Warren (Detroit), Michigan
Distributors in Principal Cities.



FORMSPRAG
CLUTCHES

Precision Power Transmission Products

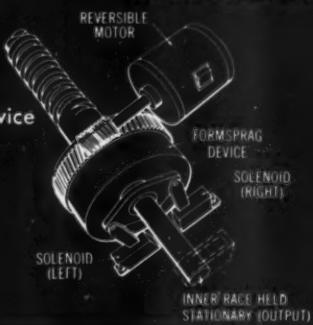
Patent Applied For



Two-Speed Drive and Reverse



Two-Direction Conveyor

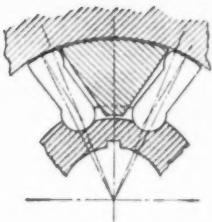


Position Device



BECAUSE there is a complement of sprags arranged in opposing pairs, there is always a multiple number of contact surfaces engaging the outer race when feedback or backstopping conditions are present. This provides equalized radial loading and strong holding torque against even unusually heavy feedback.

The entire complement of sprags, which is a part of the output member assembly, rotates at driving speed while outer race remains stationary. Thus, sprags are in light contact with the outer race and are always in position to pick up the feedback load at constantly changing points on the outer race. This design feature assures longer life through even distribution of wear over entire surface of outer race. With sprags in constant contact with outer race, any independent movement of output shaft causes instantaneous locking of sprags—there is no backlash on output shaft.



RAWSON Centrifugal Clutches

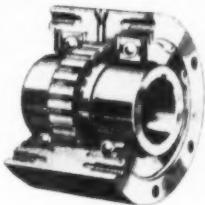
No-Load Motor Starts, Cushioned Starting of High-Inertia Loads, Overload Protection.



OTHER FORMSPRAG PRODUCTS

FORMSPRAG Over-Running Clutches

For Every
Over-Running,
Indexing &
Backstopping
Application



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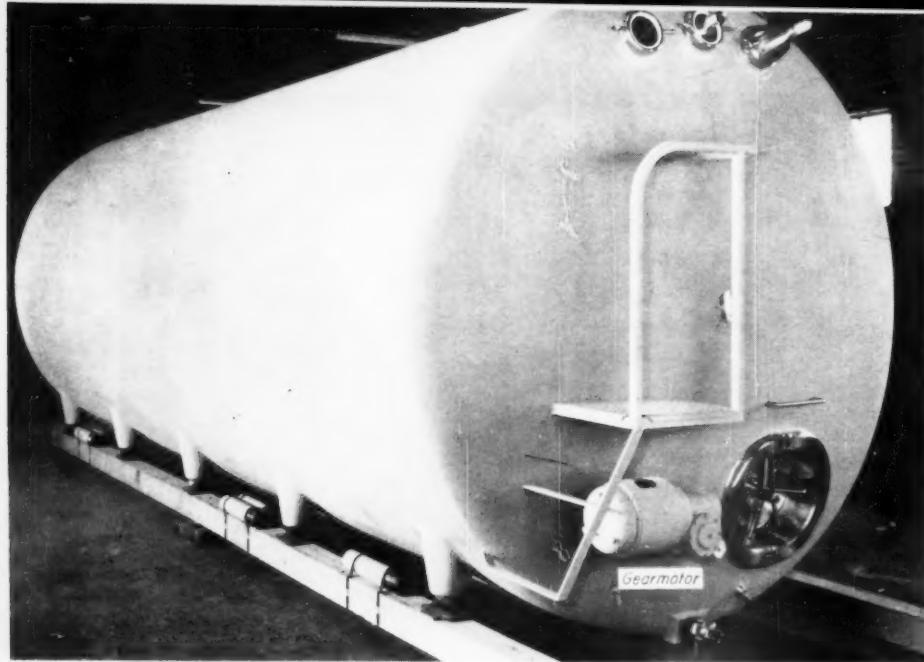


Fig. 1. This 2-hp, 100 rpm gearmotor driving an agitator on a milk storage tank shows the neat, clean installation possible.

How to select and use

Gearmotors and motorized reducers

COMPACTNESS, a neat uncluttered installation, Fig. 1, smooth transmission of power, and long life are the primary reasons for using gearmotors or motorized reducers rather than other means to get speeds higher or lower than speeds normally provided by electric motors. Although there are other ways of getting reduced or increased speed, no other method or methods can offer this particular combination of characteristics.

Another advantage of gearmotors and motorized reducers is that responsibility for proper functioning and matching of both the motor and gear units is undivided.

Physical Characteristics

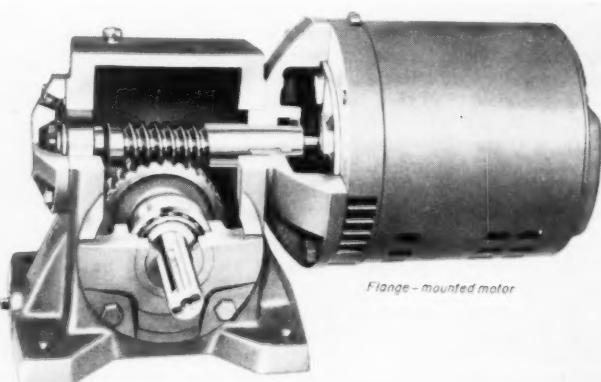
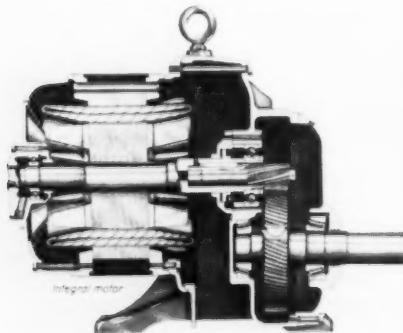
Gearmotors consist of a gearbox and an integrally-

assembled or flange-mounted motor, Fig. 2. Depending upon the type of construction and the reduction ratio, a gearmotor may be indistinguishable from, and little larger than, an electric motor.

Motorized reducers consist of a gearbox with an integral mounting platform for a standard base-mounted electric motor, Fig. 3. For this reason, the motorized reducer usually offers a higher degree of versatility and convertibility. Motors of the same frame size but with different electrical characteristics may be quickly substituted, and standard motors may be used for replacement. If a number of identical units are being used in a plant, one spare motor can serve as a standby for all.

The versatility of the motorized reducer is offset to

Fig. 2. Gearmotors may use integrally assembled or flange-mounted motors.



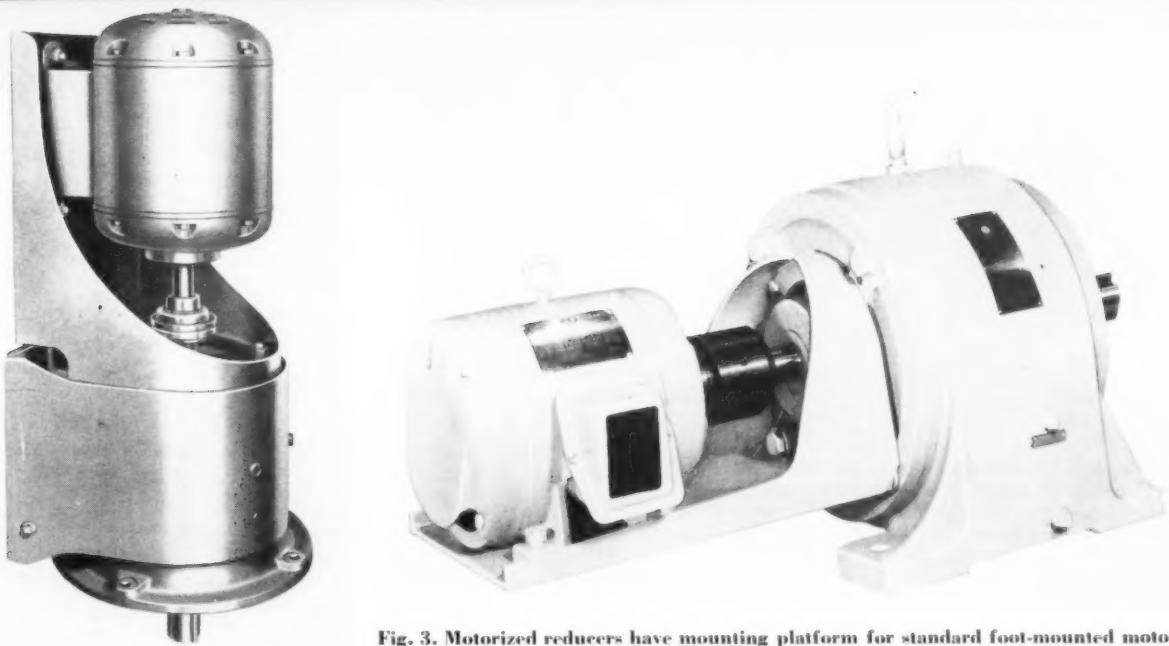


Fig. 3. Motorized reducers have mounting platform for standard foot-mounted motors. They may be designed for flange mounting or foot mounting.

some degree by the increase in size and weight as compared to a gearmotor which necessarily accompany this type of construction.

Motors: Electric motors used with gearmotors and motorized reducers may be of any standard type. Most widely used are polyphase induction, or squirrel cage. However, slip-ring, dc, torque, and synchronous motors may be used when such characteristics are needed.

Power, speed, and torque: A number of manufacturers produce gearmotors covering the range from 1 to 125 hp. Output speeds of units in this horsepower range are commonly from 1430 to 1 rpm. Table I shows speeds and the corresponding reduction ratios within this range as recommended by AGMA.

These ratios are based on a geometrical progression with a ratio of 1.225. Base speeds from which the values are gotten are 1750, 1430, and 1165 rpm. The 1750 and 1165 rpm speeds are assumed full-load speeds of 60-cycle induction motors with synchronous speeds of 1800 and 1200 rpm. The 1430 rpm is assumed full-load speed for 25 and 50-cycle motors with synchronous speed of 1500 rpm. Permissible tolerances on these speeds are $\pm 2\%$ for single reductions and $\pm 4\%$ for double, triple and quadruple reduction.

In addition to these standard range gearmotors, units are available, although from fewer sources, to give both higher and lower output speeds. Also, the complete range of horsepowers covered by available units is from 1/20 to 300 horsepower or more. Total speed range is from revolutions per day values to more than 10,000 rpm. Reduction ratios as high as 60,000:1 are available in certain size units.

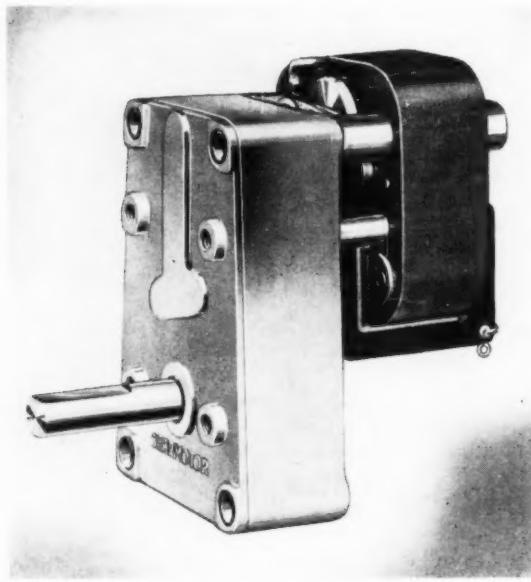
Gearing and efficiency: Spur, helical, herringbone, planetary, worm and spiral bevel gearing are used in gearmotors. More than one kind may be used in a single reducer. For example, a first spur or helical gear reduction may be followed by a worm set. Most

Table I - AGMA Standard Output Speeds for Gearmotors

Standard gearmotor output speeds (rpm)	Ideal ratios for motor speeds of		
	1750 rpm	1430 rpm	1165 rpm
1430	1.225	—	—
1170	1.500	1.225	—
950	1.837	1.500	1.225
780	2.250	1.837	1.500
640	2.756	2.250	1.837
520	3.375	2.756	2.250
420	4.134	3.375	2.756
350	5.042	4.134	3.375
280	6.200	5.063	4.134
230	7.594	6.200	5.062
190	9.300	7.594	6.200
155	11.39	9.300	7.594
125	13.95	11.39	9.300
100	17.09	13.95	11.39
84	20.93	17.09	13.95
68	25.63	20.95	17.09
56	31.39	25.63	20.93
45	38.44	31.39	25.63
37	47.08	38.44	31.39
30	57.67	47.08	38.44
25	70.63	57.67	47.08
20	86.50	70.63	57.67
16.5	105.9	86.50	70.63
13.5	129.7	105.9	86.50
11.0	158.9	129.7	105.9
9.0	194.6	158.9	129.7
7.5	238.4	194.6	158.9
6.0	291.9	238.4	194.6
5.0	357.5	291.9	238.4
4.0	437.9	357.5	291.9
3.3	536.3	437.9	357.5
2.7	656.8	536.3	437.9
2.2	804.5	656.8	536.3
1.8	985.3	804.5	656.8
1.5	1207	985.3	804.5
1.2	1478	1207	985.3
1.0	1810	1478	1207



Fig. 4. Extremely small gearmotors are available. Unit above is typical of a line of gearmotors for servo applications which may weigh as little as 6.5 oz and have a reduction ratio in excess of 12,000:1. Unit below is typical of units measuring as little as 3-3/4 x 2-5/8 x 2-15/32 in. and intended for applications such as pin-ball machines.



GEARMOTORS *continued*

commonly used gears are helical and worm. Helical gearing is used for its quietness and high load carrying capacity, while worm gearing is used primarily to get the output shaft positioned at right angles to the motor shaft for applications where a right angle drive is needed.

Efficiencies of gearmotors are high. In general they are above 90%. In fact, the great majority of them have efficiencies of from 95 to 98%. Each spur or helical gear mesh and its supporting bearings will have an associated power loss of 1 to 2%. Power loss in a worm set is about 50% of the reduction ratio, i.e. power loss for a 10:1 reduction is 5%. Thus, efficiency decreases as the number of gear meshes and total reduction increases.

Manufacturer of the gearmotor or motorized reducer can be depended upon to pick the best combina-

tion of gearing and number of reduction steps to give best efficiency for a particular overall reduction ratio. This is another reason for the popularity of gearmotors.

Mounting and shaft arrangements: Three basic mounting arrangements are used: (1) Foot mounting, (2) Flange mounting, and (3) Shaft mounting. The first two types may be mounted on vertical or horizontal surfaces with the shaft pointing up, down, right, or left with almost no exceptions, as long as the shaft is either parallel or perpendicular to the horizontal. Fig. 5. Due to the oil bath lubrication system used, there are usually restrictions on mounting gearmotors with shafts at an angle to the horizontal. Allowable range of this angle is from 15 to 45 deg and varies with the type of reducer, number of reduction steps, and whether the shaft points up or down.

Shaft-mounted gearmotors, Fig. 6, have a female driving member and are designed to mount directly on shafts positioned at any angle. Units may be mounted with motor above, below, to right or left of the reduction unit, or in any intermediate position. If motor is to be below the reduction unit, a special seal may be needed. So, the intended mounting position should always be specified.

There are many variations in shaft position relative to the axis of the gearmotor. Output shaft may be coaxial with the motor shaft; it is at right angles to the motor shaft on worm and spiral bevel gearmotors, and it may be parallel to but above or below the motor shaft. Dual output shafts are also available on some manufacturers' gearmotors, Fig. 7.

With the exceptions of shaft-mounted gearmotors and certain vertical, inline reducers, output shafts are straight with a square keyway, and are meant to be coupled to the load by a flexible shaft coupling unless connected through chain and sprocket or some other similar method.

The vertical inline gearmotors mentioned in the previous paragraph may also be supplied with straight shafts with keyways, but additionally they are designed so they may be used with extra long shafts for mounting impellers or mixing paddles.

Lubrication: Gearing in a gearmotor is lubricated by a sealed in charge of oil. Usually, the oil is distributed by dip and splash. In some cases, a small plunger pump may be built into the gearcase to circulate the oil. This is usually done where physical layout prevents the gears from dipping into the oil as in certain vertical gearmotors.

Because of the lubrication methods, gearmotors cannot always be mounted in any position. Although the same basic design may usually be mounted in almost any position, there are certain modifications made by the manufacturer in types of seals and location of drain and fill plugs to fit the unit to a particular mounting position.

Lubrication method is also one of the factors which make gearmotors very attractive drives for certain applications. These applications are in places where lub-

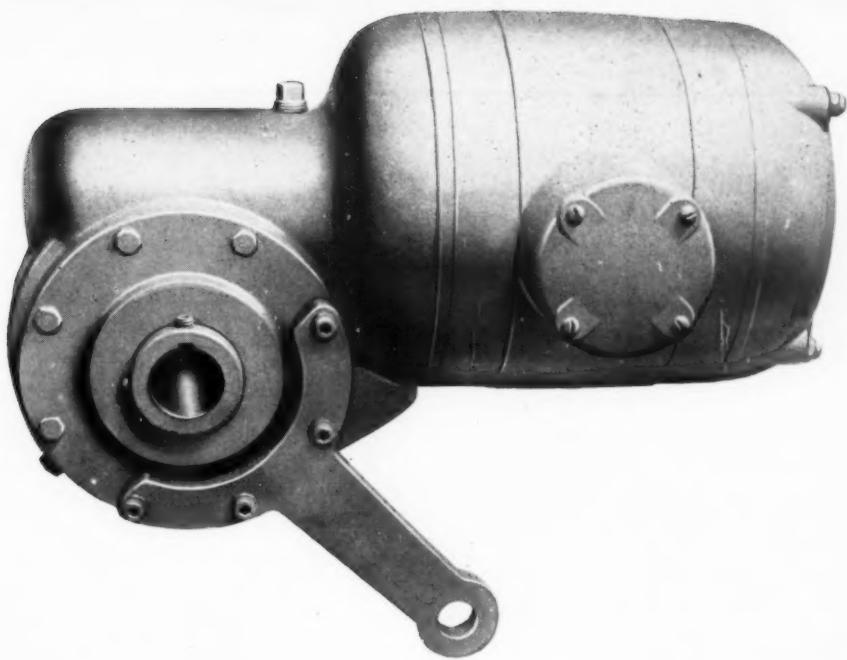


Fig. 6 Right-angle gear motor for mounting directly on driven shaft.

ricant contamination which could occur with open drives is taboo. Another general class of application where the sealed-in gearmotor drive stands out is on dirty jobs where life of open drives would be appreciably shortened by dirt or moisture in the air.

Special modifications: Many manufacturers offer their gearmotors with built-in accessory items to increase utility. Among these are brakes, fluid couplings, and backstops to prevent loads from running away, or reversing when the drive stops.

Applications and Selection

First step in selecting a gearmotor for a particular application is to determine the required output torque and speed. Next, the operating cycle should be carefully analyzed to determine the class of service as defined by AGMA. These classes depend upon intensity and duration of shock loads and number of hours of operation per day, as follows:

Class I—For steady load not exceeding the ratings of the motor, or for light shock loads, and for operation from 8-10 hours a day. When operation is intermittent, moderate shock loads are allowable. The gears are designed or selected so that their power rating equals the motor rating.

Class II—For steady load not exceeding the rating of the motor, and for operation during 24 hours a day. Moderate shock loads are allowable during 10 hours a day. The gears are designed or selected so that their power rating divided by a service factor of 1.4 is made equal to the motor rating.

Class III—For moderate shock loads during 24 hours a day. Heavy shock loads are allowable during 10 hours a day. The gears are designed or selected so

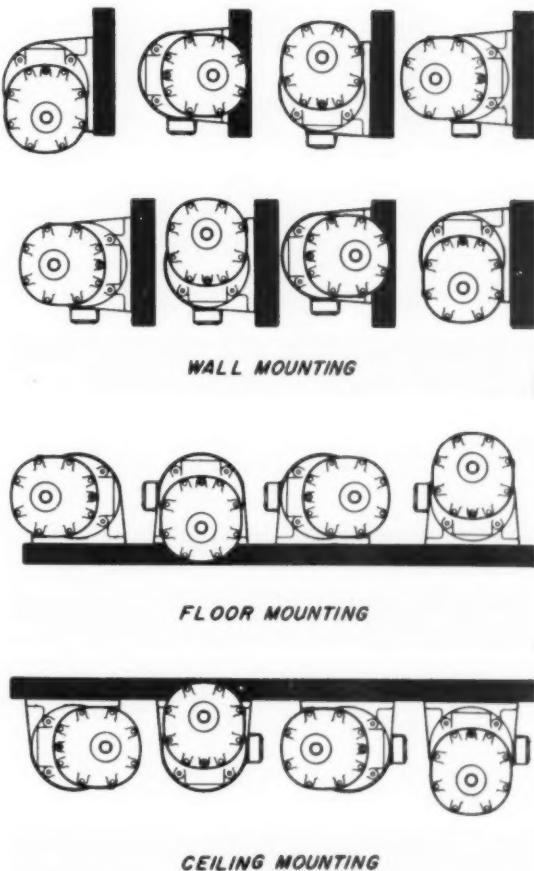


Fig. 5. Possible variations in mounting position of a line of parallel shaft gearmotors. Variations in shaft position are also shown.

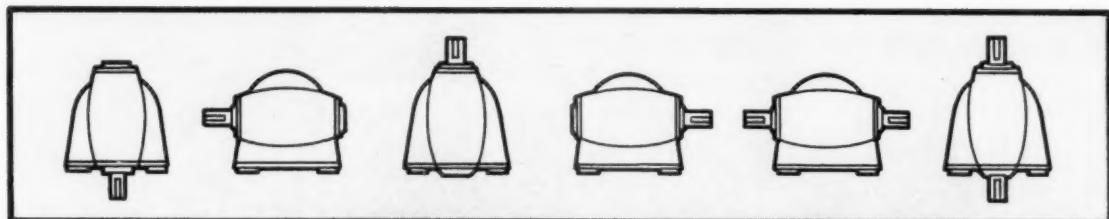


Fig. 7 Sketches indicate possible variations in output shaft location of right-angle gearmotors.

GEARMOTORS *continued*

that their power rating divided by a factor of 2 is equal to the motor rating.

Classes of service into which many applications fall are shown in Table II. This table may be used as a guide in many cases. In evaluating class of service as affected by shock loading, intensity of shock loads may vary inversely with frequency as shown by the curves in Fig. 8.

The preceding classes of service and the data in Table II and Fig. 8 applies only to gearmotors using helical, herringbone, spur, and planetary gearing where the output shaft is concentric with or parallel to the motor shaft.

The three previously defined classes of service do not include applications with high-torque motors, motors for intermittent operation, applications where extreme repetitive shock occurs, or where high energy loads must be absorbed as when stalling. Typical of

these types of applications are: runout tables, sheet catchers, and machines with flywheels on the output shafts. All such cases need special consideration.

If the gearmotor will be subjected to any overhung load on the output shaft, it should not exceed the value obtained from

$$W = \sqrt{\frac{290 T^2}{K}}$$

where W = overhung load, lb

T = output shaft torque, lb-in.

K = variable with class of service previously defined.

= 1 for Class I

= 1.41 for Class II

= 2.00 for Class III

Permissible values of overhung load for standard AGMA output speeds and horsepowers to 75 have been calculated and tabulated by AGMA in Standard 462.01.

Actual overhung load for any application is obtained by first finding tangential force and then multiplying by a factor which allows for the type of drive used. Tangential force is gotten from

$$W_T = \frac{63,000 P}{n R_p} = \frac{T}{R_p}$$

where W_T = tangential force, lb

P = transmitted hp

n = shaft speed, rpm

R_p = pitch radius of driven sprocket, pinion, or pulley, in.

T = torque transmitted by low-speed shaft, lb-in.

Factors used to multiply W_T to find overhung load are:

1 for chain

1.5 for V-belts

1.25 for pinions

2.5 for flat belts

Manufacturers catalogs will usually contain data to greatly simplify the sizing procedure. Tables contain such data as output speed, class of service, output torque, hp, and allowable overhung load. Other extremely pertinent information such as size, weight, and available motor types is also included.

There are, of course, many other factors affecting selection of gearmotors. Typical of these are: size, weight, type of motor needed, etc. **▲▲▲**

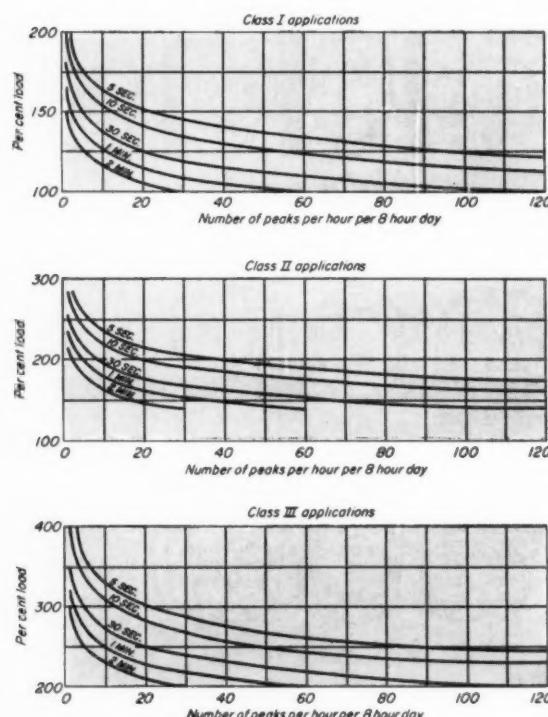


Fig. 8. For a given service class, frequency of shock loading may vary inversely with intensity and duration.

Table II — Gearmotor service classes by application

Application	Service class		Application	Service class		Application	Service class	
	10 hour service	24 hour service		10 hour service	24 hour service		10 hour service	24 hour service
AGITATORS			CUTTER HEAD DRIVES (dredges)	3	3	MIXERS —(Continued)		
paper mills (mixers).....	2	2	CUTTERS (paper).....	—	3	constant density.....	1	2
pure liquid (blade or prop.).....	1	2	CYLINDER (paper).....	—	2	variable density.....	2	2
liquids & solids.....	2	2	DOUGH MIXER (food).....	2	2	rubber.....	3	3
variable density liquids.....	2	2	DRY CANS (textile).....	2	2	sewage.....	2	2
BALL MILLS	2	2	DYEING MACHINE (textile).....	2	2	NAPPERS (textile).....	2	2
BARGE HAUL PULLERS	2	3	DRYERS (paper).....	—	2	NOTCHING PRESS belt driven.....	1	2
BARKING DRUM	2	2	DRYERS & COOLERS (mills rotary).....	2	2	ORE CRUSHER	3	3
hydraulic auxiliaries.....	—	3	ELEVATORS			OVEN CONVEYOR —uniform.....	1	2
mechanical.....	—	3	bucket uniform load.....	1	2	heavy.....	2	2
BAR SCREEN (sewage).....	1	2	bucket heavy duty.....	2	2	PARAFFIN FILTER PRESS	2	2
BATCHERS (textile).....	2	2	bucket continuous.....	1	2	PEBBLE MILLS	2	2
BEATER & PULPER (paper).....	—	2	centrifugal grav. discharge.....	1	2	PLANER (reversing).....	3	3
BEET SLICER	2	2	freight.....	2	2	PRESSES (paper).....	—	2
BENDING ROLL (mach.).....	—	2	service hand lift.....	3	—	(printing).....	1	2
BLEACHER (paper).....	1	2	ESCALATORS	1	1	PUG MILLS (clay).....	2	2
BLOWERS			FANS			PULLERS (barge haul).....	2	3
centrifugal, vane.....	1	2	centrifugal, light.....	1	2	PULP MACHINES (paper).....	—	2
lobe.....	2	2	cooling tower induced draft.....	2	2	PULVERIZERS (hammermill).....	3	3
BOTTLING MACHINERY	1	2	induced draft, large mine.....	2	2	PUMPS		
BREW KETTLES Cont.	—	2	large industrial.....	1	2	centrifugal.....	1	2
BRICK PRESS (clay).....	3	3	FEEDERS			proportioning.....	2	2
BRIQUETTE MACHINE (clay).....	3	3	apron, belt, screw.....	2	2	single acting, 3 or more cyl.	2	2
CABLE REELS	2	—	disc.....	1	2	double acting, 2 or more cyl.	2	2
CALENDERS			reciprocating.....	3	3	rotary gear, lobe or vane.....	1	2
(paper).....	—	2	FELT			PUNCH PRESS —gear driven.....	3	3
super (paper).....	—	3	stretcher (paper).....	—	2	RECIPROCATING		
(rubber) (textile).....	2	2	whipper (paper).....	—	3	conveyor, feeder.....	3	3
CANE KNIVES	2	2	FORMING MACHINE (metal).....	3	3	pump, 3 or more cyl.	2	2
CAN FILLING MACHINES	1	2	GRIT COLLECTOR (sewage).....	1	2	REEL (paper).....	—	2
CARD MACHINE (textile).....	2	2	HAMMER MILL	3	3	SCALE HOPPER (brewing).....	2	2
CAR DUMPERS	3	—	JIG DRIVES (dredges).....	3	3	SCREENS		
CAR PULLERS	2	—	JORDANS (paper).....	—	3	air washing.....	1	2
CEMENT KILNS	—	2	KILNS (rotary).....	2	2	dewatering.....	2	2
CENTRIFUGAL			LAUNDRY WASHERS & TUMBLERS	2	2	rotary stone or gravel.....	2	2
blowers, compressors, discharge elevators, fans, pumps.....	1	2	LINE SHAFT—driving processing equipment.....	2	2	traveling water intake.....	1	2
CHAIN CONVEYOR			other.....	2	2	SCREEN DRIVE (dredges).....	3	3
uniform.....	1	2	LOG HAUL (paper).....	1	2	SCUM BREAKER (sewage).....	2	2
heavy duty.....	2	2	LOOMS (textile).....	2	2	SHEETER (rubber).....	2	2
CHEMICAL FEEDER (sewage).....	1	2	MACHINE TOOLS			SKIP HOIST	2	2
CHILLERS	2	2	auxiliary drives.....	1	2	SLAB PUSHER	2	2
CLARIFIERS	1	2	bending roll.....	—	2	SLITTERS	2	2
CLASSIFIERS	2	2	main drives.....	2	2	SOAPERS (textile).....	2	2
CLAY WORKING MACHINERY	2	2	notching press (belted).....	1	2	SPINNERS (textile).....	2	2
CLOTH FINISHING MACHINE	2	2	plate planer.....	3	3	STACKERS (dredges).....	2	2
COLLECTORS sludge (sewage).....	1	2	punch press (gear).....	3	3	STEERING GEAR	2	2
COMPRESSORS			tapping machines.....	—	3	STOCK CHEST (paper).....	—	2
centrifugal.....	1	2	MANGLE (textile).....	2	2	STOKERS	1	2
lobe, recipr. multi-cylinder.....	2	2	MASH TUBS (brewing).....	—	2	SUCTION ROLL (paper).....	—	2
recipr. single-cylinder.....	3	3	MEAT GRINDER (food).....	2	2	TABLE CONVEYOR		
CONVERTING MACHINE (paper).....	—	2	METAL MILLS			non-reversing.....	2	2
CONVEYORS —uniformly loaded or fed: apron, assem., belt, bucket, chain, flight, oven, screw.....	1	2	draw bench carriage.....	3	3	TENTER FRAMES (textile).....	2	2
CONVEYORS —heavy duty not uniformly fed: apron, assem., belt, bucket, chain, flight, oven, or screw.....	2	2	draw bench main drive.....	2	3	THICKENERS (sewage).....	2	2
CONVEYORS —severe duty reciprocating, shaker.....	3	3	forming machine.....	3	3	TIRE BUILDING MACHINE	2	2
COOKERS (brewing and distilling) (food).....	1	2	slitters.....	2	2	TIRE & TUBE PRESS OPENER	1	1
COUCH (paper).....	—	2	table conveyor non-rev.....	2	2	TRAVEL MOTION (crane).....	2	2
CRANES & HOISTS —med. duty reversing, skip, travel motion, trolley motion.....	2	2	wire drawing or flattening.....	2	2	TROLLEY MOTION (crane).....	2	2
CRUSHERS —ore, stone.....	3	3	wire winding.....	—	2	TUBERS & STRAINERS	2	2
			MILLS ROTARY			TUMBLING BARRELS	3	3
			ball, pebble.....	2	2	VACUUM FILTERS (sewage).....	2	2
			cement kilns.....	—	2	VANE BLOWER	1	2
			coolers, dryers, kilns.....	2	3	WASHER AND THICKENERS (paper).....	—	2
			rod, tumbling barrels.....	3	3	WINCHES , maneuvering, utility.....	2	—
			MINE FAN	2	2	WINDERS (paper).....	—	2
			MIXERS			(textile).....	2	2
			concrete (cont).....	2	2	WINDLASS	2	2
			concrete (inter).....	1	—	WIRE		
						drawing machine.....	2	2
						winding machine.....	—	2



Specify 'honing' on drawings—and

By BEN F. BREGI, vice president-research, National Broach and Machine Co.

TAKE A NOISY GEAR train and have the high speed gears honed—and you will come up with a quiet gear set. Specify honed gears in your gear train design—and your machine will have much less of the age-old gear 'hum'.

Honing is a final-most operation on gears. It is always done after heat-treat and only takes a minute or two in high production operations. It is a relatively new process and, in most cases, replaces grinding which has been a substantial finishing operation for years. Honing also, to some extent, replaces lapping which has been used to quiet gears, but usually mates 'good' gears.

Honing is unlike shaving and burnishing which are done before heat-treat as corrective processes.

HONING is a finishing process, after heat-treat, in which an abrasive-impregnated, gear-like tool is run in mesh with the gear. It is done in a crossed-axis relationship so that the honing teeth slide along the gear teeth. The gear is driven by the honing tool at high speed, up to 1000 sfpm, in both directions so that both sides of the teeth get polished. The tool is a throw-away type and is discarded after useful life.

SHAVING is a semi-finishing operation, usually done as a corrective measure before heat-treat. For this reason, shaving and honing are not competitive and may both be specified in a gear finishing process. Shaving is generally performed at lower hardnesses up to 38 Rockwell C. Two types of cutters are used: rotary and rack. The rotary cutter has teeth with profiles like that of the gear. As the cutter rotates, notches scrape off little shavings from the tooth surfaces.

GRINDING is also a finishing operation performed on hardened gears after heat treat. It is usually performed after side reference surfaces are

Shaving, in particular, is used widely whether or not honing is called for.

If you recall, only a few years ago, you could tell the make of car as it started up by its particular 'hum'. That was gear noise. Some trucks, even today, are body-quiet but gear-noisy. All of this is changing, as it has already done on car, by honing on U. S. built vehicles. In most automobile transmissions, all gears are honed. If not all, the high speed pinions and ring gears are. Noise generated by the intermediate and tertiary gearing, below audible level, can be tolerated. Truck transmission and differential manufacturers are following this forward step.

Grinding of gear teeth is an expensive and time-consuming process since only one tooth or space can

finished. There are chiefly two types of grinding: form and generating. Form grinding uses a disc wheel to grind both sides of the space between the teeth. Action is similar to that of a milling cutter, back and forth. The wheel has an involute form. Generating grinding is done with either disc or threaded wheel. With a disc wheel, three motions are used: the wheel rotates, the spindle is moved back and forth over the gear, and the wheel moves sideways. With the threaded wheel, action is similar to hobbing. Several roughing cuts bring it down to size; finishing cuts clean it up.

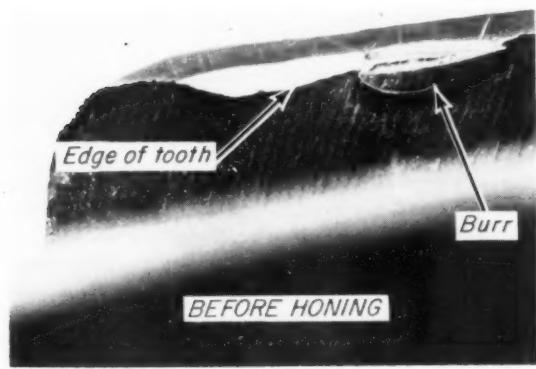
BURNISHING is a semi-finish operation performed on already-generated gears before heat-treat. It consists of rolling gears between hardened master gears to iron out the inequalities in tooth surfaces.

LAPPING is an old-established method of improving hardened gear teeth surfaces after heat treat. It is done in two ways: by running two or more gears together with lapping compound to mate them; or to use one or more gear-like lapping tools to lightly polish the tooth surfaces.

gear noise will practically vanish

be ground at a time. Extreme care is required to make certain that speed of the operation does not result in heat cracks or burning of tooth surfaces. Grinding tends to leave soft spots or a soft skin. This loss of hardness can be detrimental.

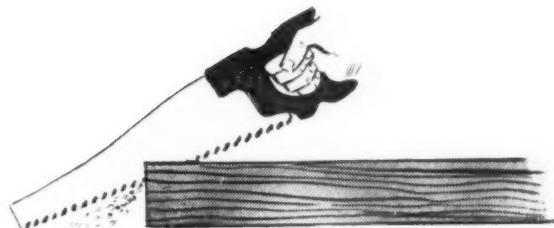
Burnishing, in which the hardened gear is run in cramp mesh with one or more hardened burnishers,



GEAR TOOTH before honing has nicks and burrs, has lead, profile and eccentricity errors.



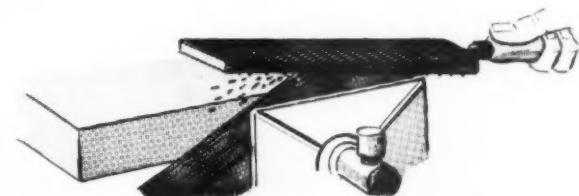
GEAR TOOTH after honing is highly polished, has no nicks and burrs, is virtually free of tooth errors.



HOBBING is like sawing. Most gears are hobbed.



SHAVING is like planing. This is done before heat-treat.



GRINDING is like filing with a smooth tool. This provides smooth finish but is costly and may leave soft spots.



HONING is like sanding. Operation is fast, precise and inexpensive.

HONED GEARS *continued*

has the disadvantage of setting up stresses in the hardened teeth. Under load, these stresses begin to relieve themselves and the teeth tend to regain original incorrect shape. Even nicks that are rolled down into the tooth surfaces by the burnisher may reappear after several hours of operation in sufficient size and number to impair the sound qualities of the running gear.

The process that has met with greatest success in improving sound qualities is lapping. This, too, is expensive and hard to control because excessive lapping tends to destroy involute form. Laps are costly

and have relatively short life. Lapping is not the type of process through which all hardened gears in a production line can be economically run. A certain amount of correction and nick removal can be achieved, but tool cost of the operation is high. When power tailstock lapping methods are used, there is an inability to correct spacing errors.

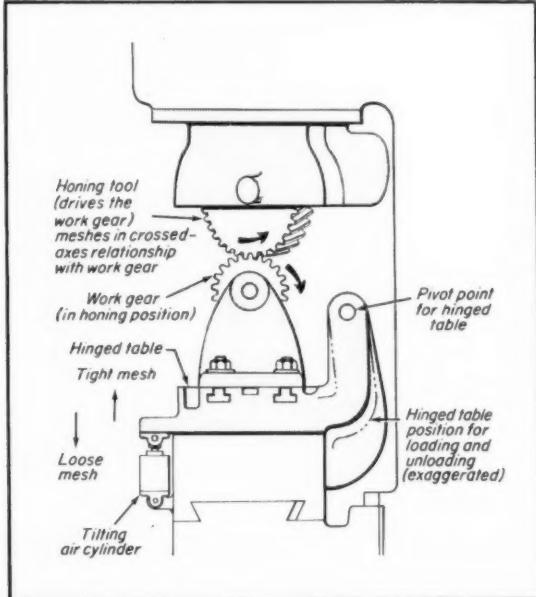
With shaving, teeth can be finished in the soft state with heat-treat distortion taken into account. Shaving has practically eliminated grinding, burnishing and lapping processes. Nicks are still unavoidably produced on gear teeth in production lines. The present method of locating these nicks on sound testing machines and removing them with a hand grinder leaves much to be desired in the way of minimum tool cost or maximum accuracy.

A method sometimes used to check for nicks and burrs in production lines has been to sound-test hard gears against masters in sound testing machines. Nicks indicated by sound necessitate visual detection and removal with a pencil wheel-type hand grinder. The gears are then sound-tested again to make certain the nicks are removed.

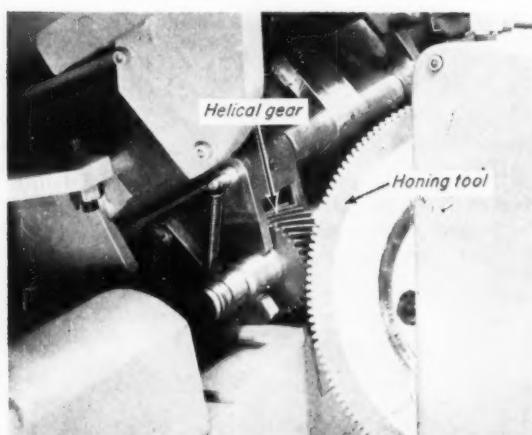
Results Achieved

With present methods, honing completely eliminates sound testing, nick detection, nick removal and second sound test operations. The overall result has been a cost saving of 35 percent in some companies and complete elimination of tear downs in finished assemblies.

As far as tooth shape corrections are concerned, a 23-tooth, $17\frac{1}{2}$ -deg pressure angle, 26-deg helix angle, $4\frac{3}{4}$ in. OD heavy duty, truck transmission gear is a typical example. The second-speed gear was carburized and hardened after shaving. Stock removal during the honing operation (performed after heat-treatment) was 0.002-in. measured over pins. Lead



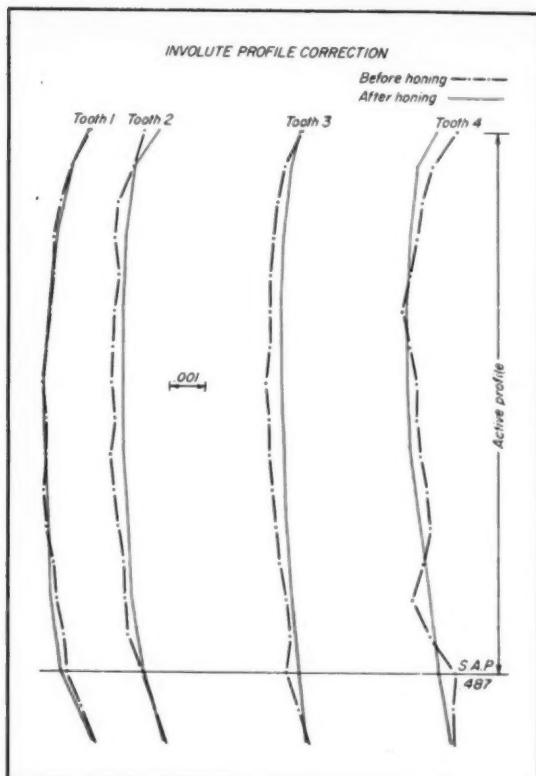
HONING PROCESS is high speed, finishes a complete gear in about a minute.



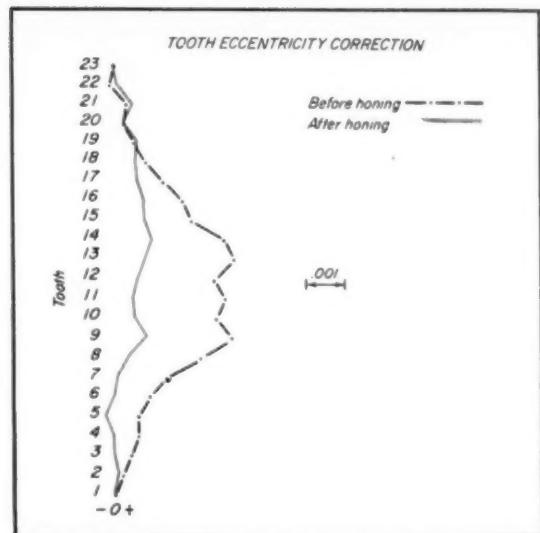
HONING TOOL drives work gear; grit-like teeth sweep along each gear tooth during rotation.

Table I
Comparison of Surface Finishes Before and After Honing

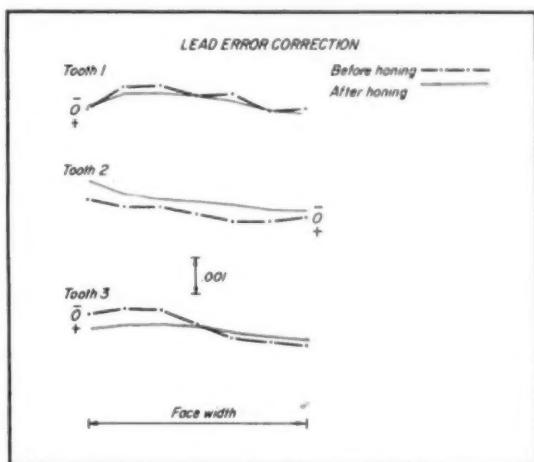
No. Teeth	Normal Diameter Pitch	Pressure Angle-Degrees	Surface Finish Before Honing-Mu., rms.	Surface Finish After Honing-Mu., rms.
44	18	20°	8-10	6
44	18	20°	10-12	8
30	6	17½°	15-18	10
19 (Long Pinion)	15.5	17½°	18-22	8-10
19 (Short Pinion)	15.5	17½°	16-19	13-15
15	20	20°	14-16	9-11
26	9.25	16½°	30-35	21-26 10-15
19	10	20°	26	18-20
27	5	20°	25-27	6-7



HONING CORRECTS involute profile errors.



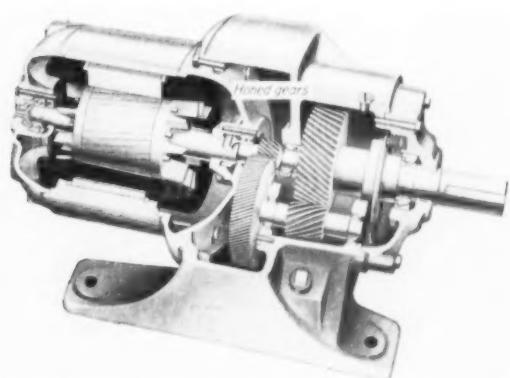
HONING CORRECTS eccentricity errors.



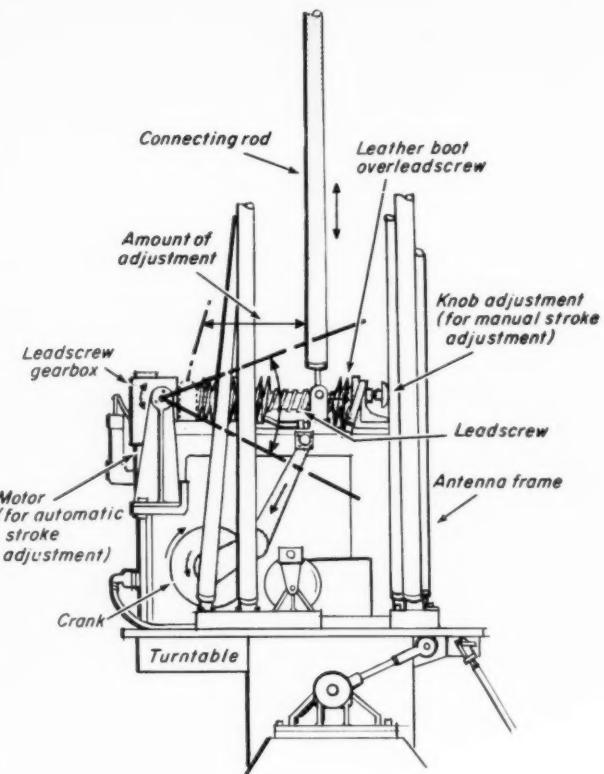
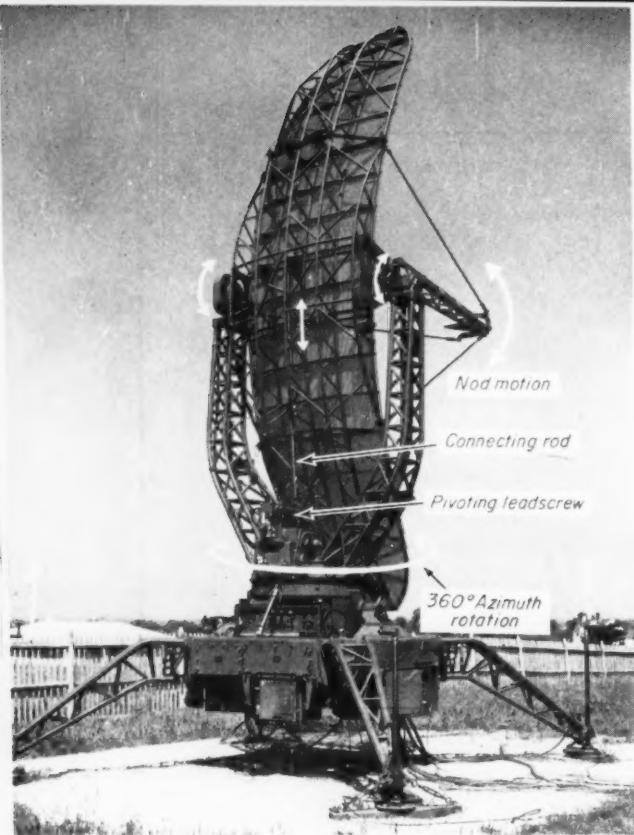
HONING CORRECTS tooth lead error.



NEW MODEL TRUCK is chassis-quiet and gear train-quiet. Gears in transmission are honed.



GEARMOTOR excels in silence and efficiency; complete gear train is honed.



Pivoting leadscrew produces adjustable stroke

By R. H. WOODYARD, project supervisor, Crosley Div., Avco Corp.

BY PIVOTING A LEADSCREW at one end, and oscillating the other like a crank, length of stroke of a rod mounted on the oscillating end can be changed by turning the screw.

This principle is used to oscillate the antenna of the new AN/MPS-16 radar. A connecting rod from the drive mechanism attaches vertically to the antenna producing a continuous 'nod' motion. The antenna continuously scans up and down at the rate of 20 nods per minute, and the degree of nod or stroke is adjustable.

The total angle up and down that the antenna nods can be adjusted by turning the leadscrew. The farther from the pivot point the connecting rod is, the greater the stroke; and vice versa.

A small 1 hp, 400 cps, 3 phase motor provides nod power. The motor operates through a gearbox whose output has a crank arm. To this arm is attached a con-

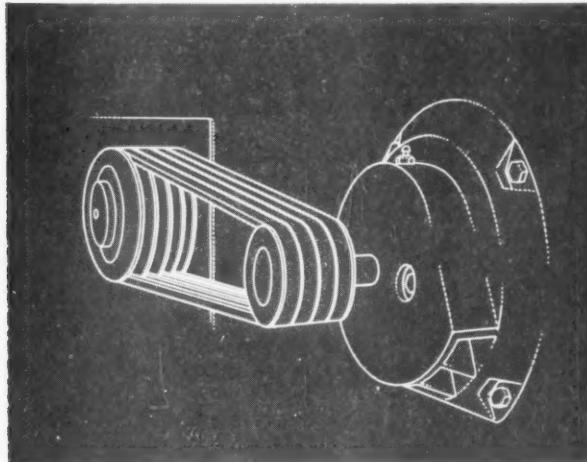
necting link that oscillates the leadscrew. The leadscrew operates the antenna.

The connecting rod is attached to the leadscrew by a yoke that can be advanced along the leadscrew. Position of the yoke can be changed either manually or electrically. It is principally done electrically through a small 1/6-hp, intermittent duty, 208 v geared-motor with magnetic brake. That is, on signal, the motor turns the leadscrew. This moves the yoke which changes connecting rod stroke. Limit switches control amount of yoke travel.

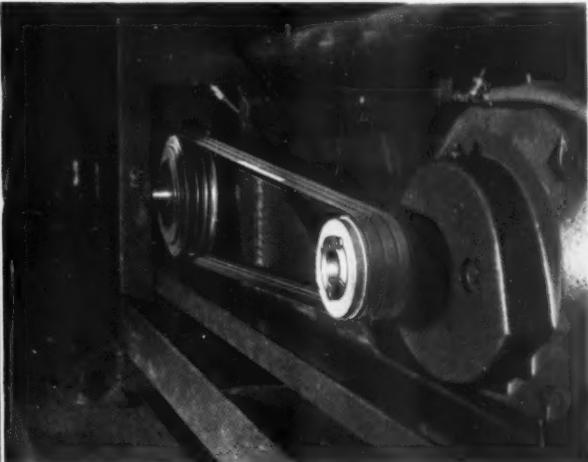
The antenna is nodded manually by engaging a brake interlock. This action cuts off power to the drive motor so that a handcrank may engage the flywheel. As an added safety feature, electrical operation cannot be resumed until the brake interlock and handcrank are disengaged.

continued on page 30

BEFORE: This drawing of the former 4-belt drive on a clothes pressing unit is in the same scale as the photo of new Super HC V-Belt Drive at right. Heavy sheaves needed for 4 belts imposed high bearing loads.



AFTER: By redesigning the drive for Gates Super HC V-Belts only 3 belts are required and this Utah manufacturer saves 16 pounds in weight and 24% on the drive cost of every pressing unit it makes.



Manufacturer of pressing equipment cuts cost of drives 24%

New high capacity V-belt also saves weight and space!

This manufacturer is just one of many who have already turned to Gates Super HC V-Belts to achieve far more compact, lighter weight, lower cost V-belt drives for all types of machines. With new Super HC

V-Belts, sheave dimensions can be reduced 30% to 50%, overall space up to 50%, and drive weight by 20% and more.

A product of Specialized Research in the world's largest V-belt laboratories at Gates, the Super HC V-Belt Drive is already standard equipment on production models in virtually every industry.

Engineering Service Nation-Wide

Whatever your plant's power transmission design problem, wherever you are, your nearby Gates Distributor or Field Representative is ready

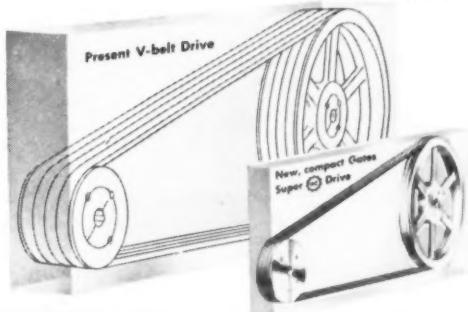
to assist you to cut space, weight, and costs with Super HC. Ask him for a copy of "The Modern Way to Design Multiple V-Belt Drives."

TPA 463

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



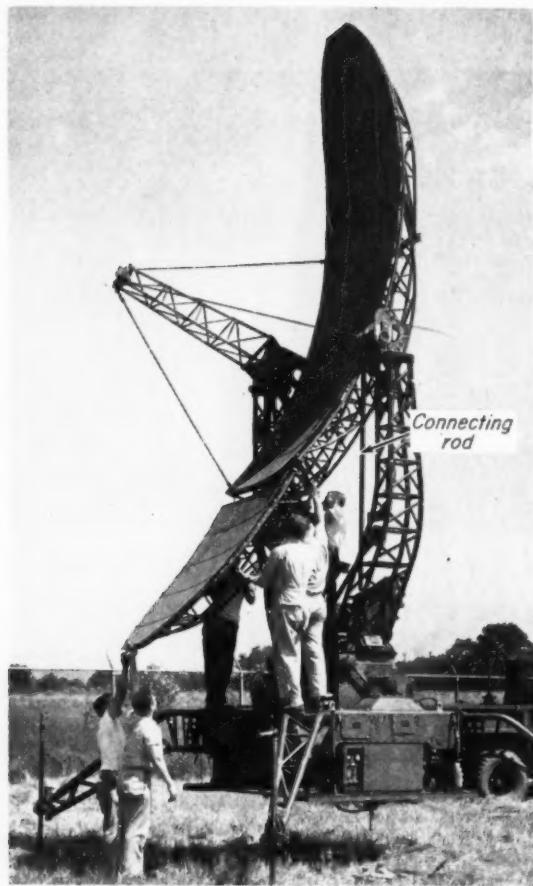
World's Largest Maker of V-Belts



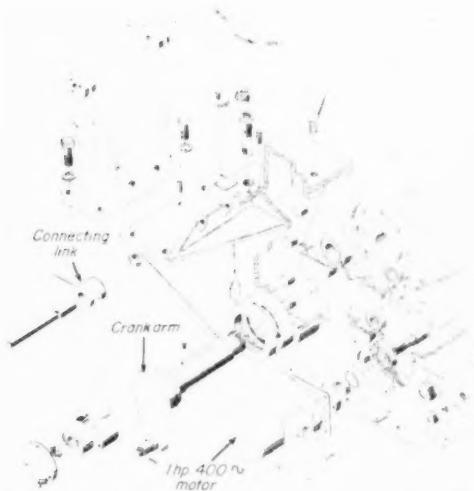
Gates Super V-Belt Drives

same hp capacity
in smaller "package"

Circle No. 21 on Reader Service Card



RADAR ANTENNA is easily disassembled.



ELEVATION GEARBOX is powered by 1 hp, 400 cps, 3 phase motor, moves antenna in nod motion.

LEADScrew PIVOTS at one end, oscillates at other. Position of connecting yoke determines stroke.

PIVOTING LEADSCREW *continued*

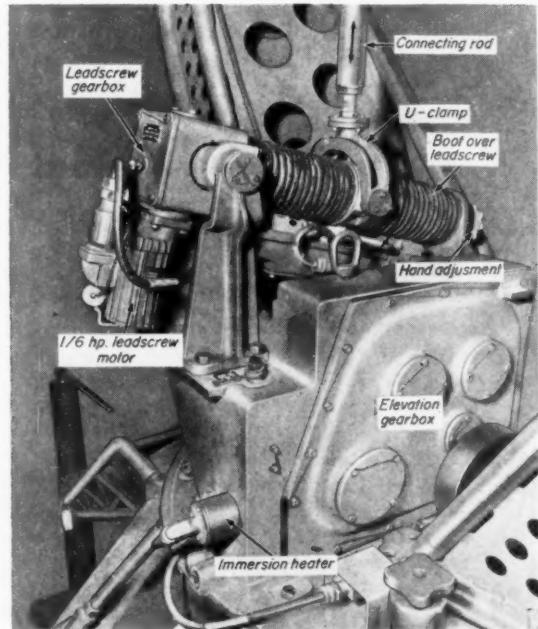
In addition to nod motion, the antenna also rotates. This is accomplished through a separate azimuth drive located integrally with the nod drive. Action is much like a crane turntable in which a small pinion engages 16 teeth of a large bull gear. Continuous rotation through 360 deg is afforded.

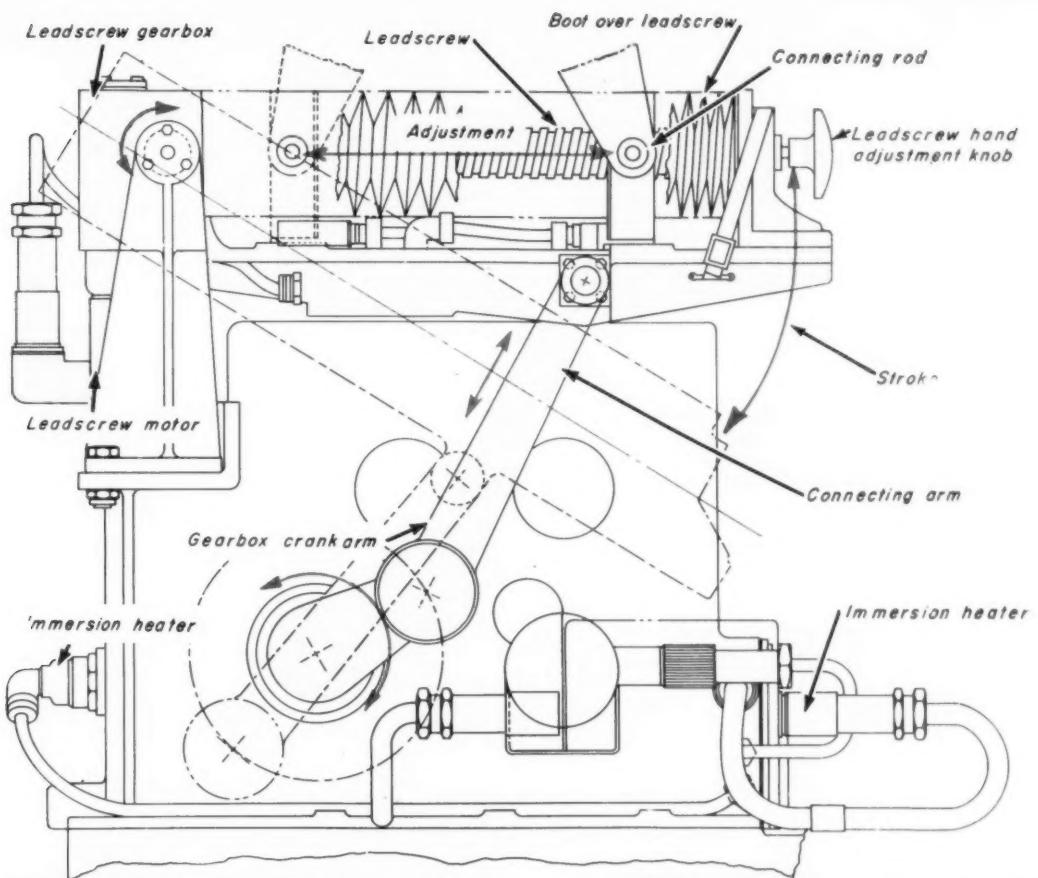
Both gearboxes are splash-lubricated with oil. During operation, the splash system keeps all the internal parts lubricated and oil seals prevent leakage. Immersion-type heaters project into the oil and control temperature thermostatically within limits.

The azimuth drive positions the antenna within $1/2$ -deg of position called for by the operator. The drive rotates the antenna at a constant speed of $1/4$ rpm and is capable of slewing 180 deg in $3\frac{1}{2}$ sec.

The radar is fully air-transportable and is light in weight. It operates 24 hr/day in all kinds of weather in rugged terrain and in winds up to 52 knots. Many are now in use by the Air Force and Marine Corps at remote outposts to keep watch on distant skies. This type radar, however, is principally a height finder which gathers nod angle data to be transmitted to a remote areas for interpretation.

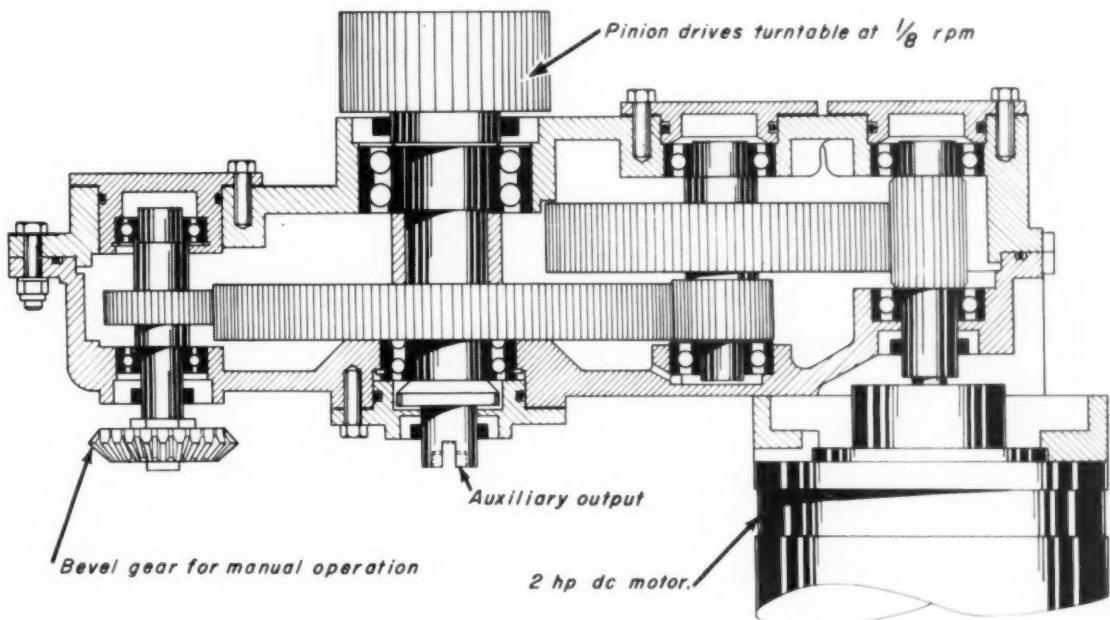
As the antenna rotates and nods, its signals are processed and amplified through a series of interconnecting servos and synchros. The target impulses are shown on the radar screen as vertical traces positioned according to range and height. This information supplements data gathered by search-type radar. Fast interaction of the elevation and azimuth drives helps produce aircrafts' height automatically within a few seconds.





ANTENNA STROKE is determined by position of yoke on leadscrew. Output crank of gearbox drives leadscrew

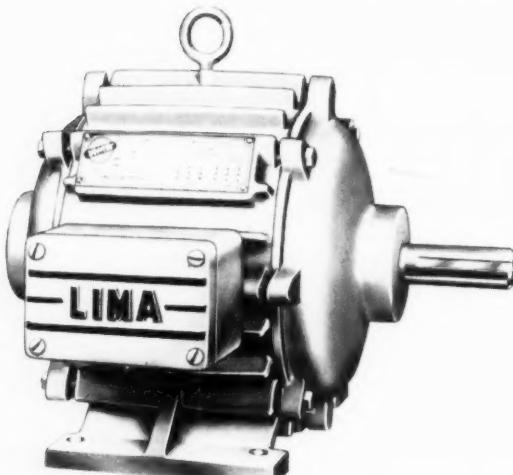
in oscillating motion. Motor on leadscrew is 1/6-hp, 208-v with magnetic brake, controls yoke position.



AZIMUTH DRIVE rotates antenna 360 deg, is powered by 2 hp d-c motor. Pinion at top engages bull ring similar to turntable on a crane.

NEW PRODUCTS

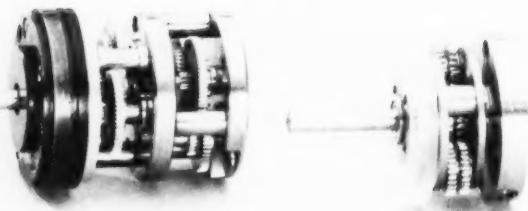
NEMA rated totally-enclosed fan-duty motor



Type EFD fan-duty motor is available in rated NEMA frame sizes 182 through 326U, $\frac{1}{2}$ through 15 hp. They are furnished in speeds of 1800, 1200, or 900 rpm. In addition to totally-enclosed housings, these motors feature deep external cooling fins said to assure adequate cooling with a reduced transverse section to give lowest air resistance. Duty rating is continuous and temperature rise is rated at 55 C. Die cast rotors are dynamically balanced. Double-width prelubricated sealed ball bearings require no greasing or cleaning for normal life. Windings are heavy multi-coated insulated wire which provide high dielectric and mechanical strength. Stators are impregnated with moisture-resisting, thermosetting varnish. The motors are available for 3 or 2 phase operation in all standard frequencies and voltages.

Lima Electric Motor Co., Inc., Lima, Ohio.

Circle No. 200 on Reader Service Card



Servo-motor gearheads

Precision planetary servo-motor gearheads have ratios up to 2500:1 with a torque rating of 25 oz-in. and maximum backlash of 10 minutes. Overall length is .300 in. Spur units are available with ratios up to 4000:1. In the low ratio series up to 37:1, two overall lengths are offered: .500 in. for a torque rating of 25 oz-in., and .609 in. for a torque rating of 50 oz-in. Maximum backlash is 15 minutes. All units in the higher ratio series from 38:1 up to 4000:1 have a torque rating of 50 oz-in. and maximum backlash of 30 minutes. All units are guaranteed for 2000 hours operating life. The gearheads also are available as complete units assembled to Size 11 BuOrd servo-motors.

U. S. Gear Corp., Wakefield, Mass.

Circle No. 201 on Reader Service Card

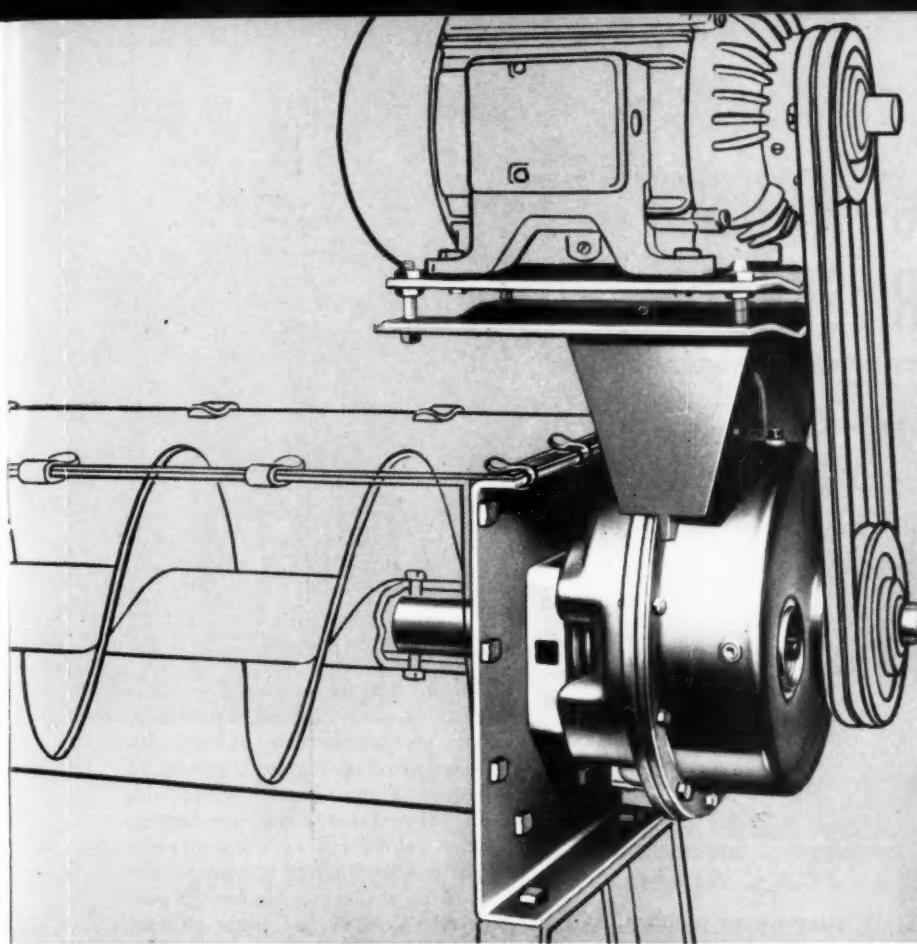


Bearing-protecting oil seals

These Clipper oil seals are said to provide effective bearing protection and extend service life by giving a durable lubricant-retaining, dirt-excluding seal between shaft and box or recess. They can be obtained in either split form for easy installation in tight places, or in a one-piece molded construction. A dense asbestos-compound heel and soft, flexible lip, concentrically molded in one piece, provide a press fit into the cavity, yet at the same time give a light, almost frictionless shaft contact that is a firm and positive seal. They are available with or without garter springs in a variety of heel and lip compositions suitable to specific temperature, speed, fluid, pressure, and similar variables.

Johns-Manville Sales Corp., New York, N. Y.

Circle No. 202 on Reader Service Card



U.S. and Foreign Patents Applied For

NEW! FALK Screw Conveyor Drive

— the drive our customers asked for

Our customers helped us design this new unit. We sent our men into the field to find out what our customers needed in a screw conveyor drive—then our engineers designed a new drive that offers the maximum of service, versatility, operating economy and long life. Here are some of its outstanding features:

A COMPLETE DRIVE: Saves engineering and assembly time. Six sizes to cover entire range—each with these ratios: — 4:1, 9:1, 14:1 and 24:1. Bolts to any standard trough end—eliminates trough end bearing. Eliminates drive shaft wobble. Efficient FALK single helical gears.

SEAL HOUSINGS: Choice of seals (neoprene or leather lip, felt or waste) to accommodate material conveyed. Space between trough seal and unit seal prevents conveyed material from reaching unit seal.

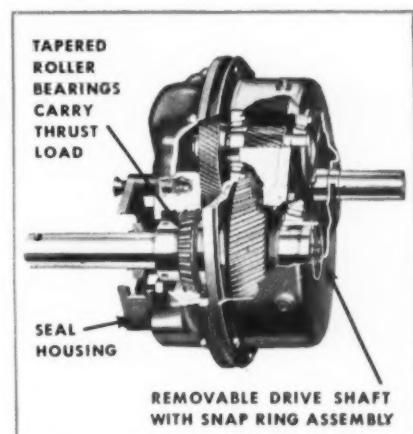
REMOVABLE DRIVE SHAFT: Snap ring assembly permits easy removal. Five sizes, from 1 1/2" to 3 1/8".

TRough END: Can be fastened to any standard trough. Eight sizes, from 6" to 20".

ALL-STEEL MOTOR MOUNT: Saves costly engineering and installation time and costs; no motor plates to design or fabricate. Motor can be mounted in virtually any position. Pre-drilled to accommodate NEMA standard motors 1/2 to 30 HP.

AN IMPORTANT ECONOMY: Buy only what you need—the basic reducer alone, or with trough end and/or motor mount. For detailed information, contact your Falk Representative or Distributor—or **write direct for Bulletin 7106.**

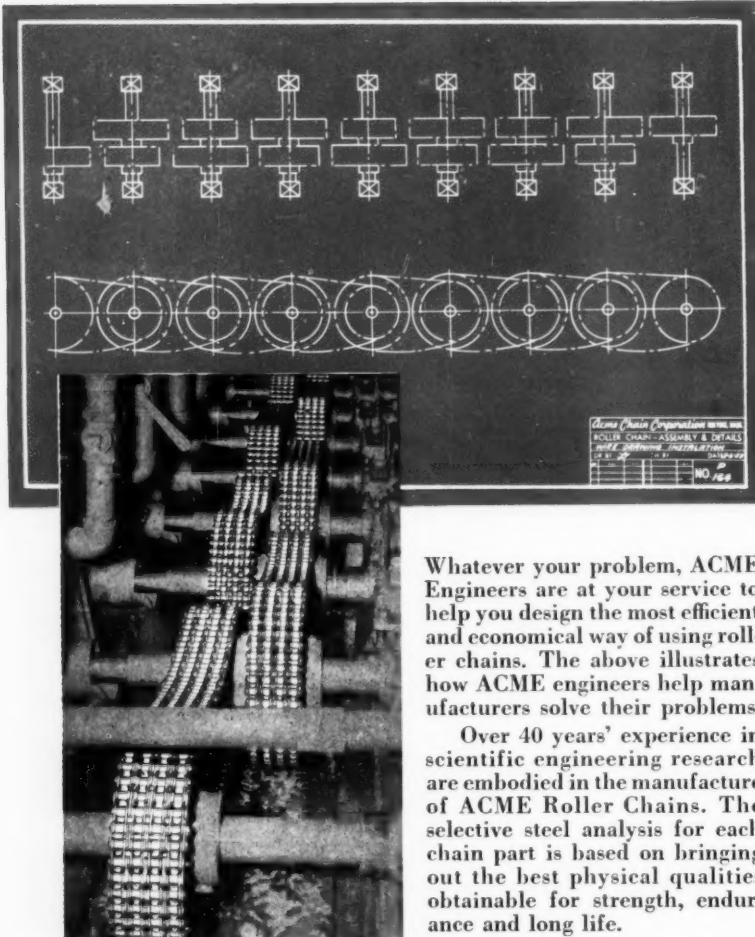
THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in most principal cities
Circle No. 18 on Reader Service Card



FALK is a registered trademark

FALK
...a good name in industry

YEARS OF ENGINEERING KNOWLEDGE AT YOUR SERVICE



Whatever your problem, ACME Engineers are at your service to help you design the most efficient and economical way of using roller chains. The above illustrates how ACME engineers help manufacturers solve their problems.

Over 40 years' experience in scientific engineering research are embodied in the manufacture of ACME Roller Chains. The selective steel analysis for each chain part is based on bringing out the best physical qualities obtainable for strength, endurance and long life.



Write Dept. 28-H
for new 100-page
illustrated technical
catalog including new
engineering section
showing 36 methods of
chain adjustments.

Write direct or call your nearest ACME Distributor for prompt, efficient service. He has the full cooperation of our engineering department.



COMPLETE LINE OF ROLLER CHAINS AND SPROCKETS • DOUBLE PITCH CONVEYOR CHAINS • STAINLESS STEEL CHAINS • CABLE CHAINS • FLEXIBLE COUPLINGS • STANDARD AND SPECIAL ATTACHMENTS

Circle No. 1 on Reader Service Card

34

PRODUCTS *continued*

Flexible shafts

One of two extra-heavy-duty power drive flexible shafts, the S100, has a 1-in. diameter core and will transmit up to 760 lb-in. of torque at 600 rpm. The S125 shaft, with a 1 1/4-



in. core, will transmit up to 1650 lb-in. of torque at 500 rpm (about 10 hp). The flexible casing is lined with oil-tempered spring steel, reinforced with wire braid, and covered with an oil-resistant, neoprene-impregnated fabric and an abrasion-resistant rubber jacket. A square slip coupling at one end has enough play to take care of any slight changes in length due to varying torque.

Stow Mfg. Co., Binghamton, N. Y.
Circle No. 203 on Reader Service Card

Dual drive unit

Independent speed control over two separate operations is possible with a unit consisting of a 1/3 hp double-shaft motor with an infinitely variable 0-400 rpm speed control on each end. Rotation in either direction to



the full speed range on one or both ends of the motor is optional. There are 14 models with torque ratings at each output shaft of 10, 15, or 20 lb-in. Optional gearheads can increase the torque of the 10-lb-in. models to 50 lb-in., or top speed to 2000 rpm.

Zero-Max Co., Minneapolis, Minn.
Circle No. 204 on Reader Service Card
continued on page 58

DESIGN
IDEAS
FROM THE FIELD

Individual drives stop system shutdown



ROTARY DRYER with individual drive.

INDIVIDUAL MOTOR DRIVES have been combined with a 50 hp steam engine in an asphalt plant to stop plant shutdown when the steam engine goes down. Measurable savings in maintenance costs have resulted.

The steam engine previously drove a pug mill, two bucket elevators, a large rotary dryer, and other equipment. Drive from the engine was through a 12-in. wide leather belt, a series of countershafts, bevel gears, and chain and sprocket drives. Changeover was prompted by a broken crankshaft in the engine which caused several days production to be lost at a measurable cost of \$500.00 per hour.

To take some of the load off the engine, the most essential equipment—a rotary dryer and a bucket elevator—were repowered.

Roller chain and bevel gears were replaced by a 30-hp motor driving a 13:1 ratio shaft-mounted speed reducer. The reducer on a jackshaft drives a pinion through a short length of chain. The pinion drives the dryer drum through a large ring gear on the outer surface of the drum.

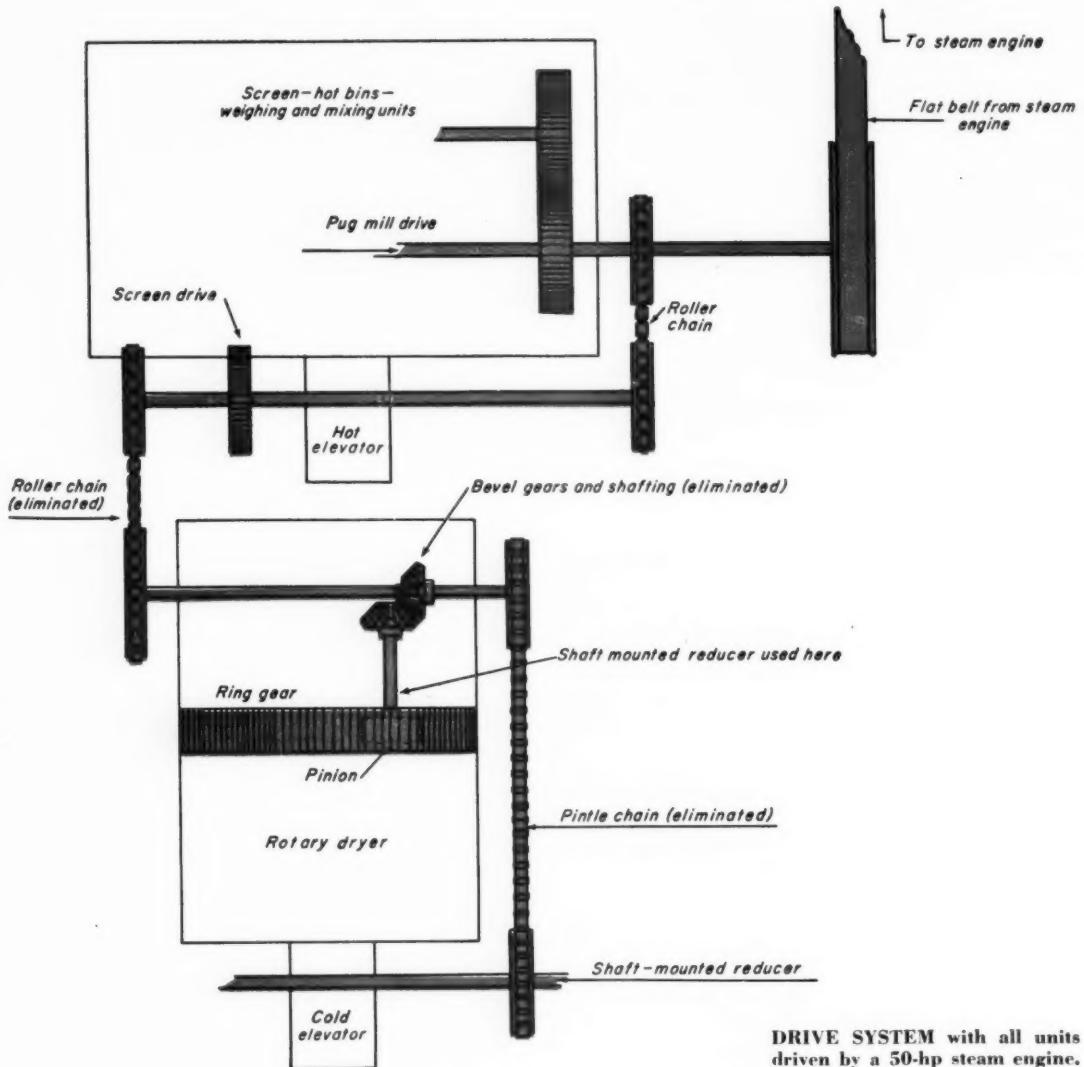
Measurable saving here is \$225.00 per year for roller chain and \$80.00 per year for bevel gears. This does not include installation cost. A shaft mounted reducer was chosen because of simplicity of installation on existing equipment. Since the bucket elevator was powered by the same shaft as the dryer bevel gears, it was necessary to also repower the elevator. A 7-1/2

IDEAS

continued



NEW BUCKET ELEVATOR DRIVE.



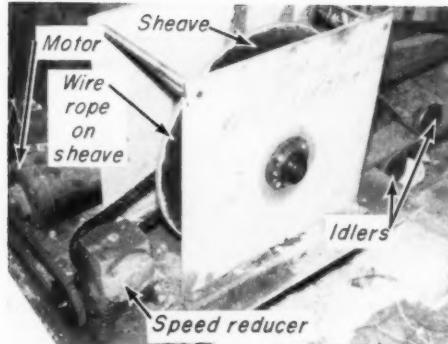
DRIVE SYSTEM with all units driven by a 50-hp steam engine.

hp motor and 20:1 ratio shaft mounted reducer did this job. Since heavy shock loads are encountered on the elevator, a torque arm overload release is used with this reducer. If an overload occurs, the torque arm disengages from the reducer body to let unit revolve freely around the concentric input shaft and output hub and eliminate any chance of damage to the reducer or motor.

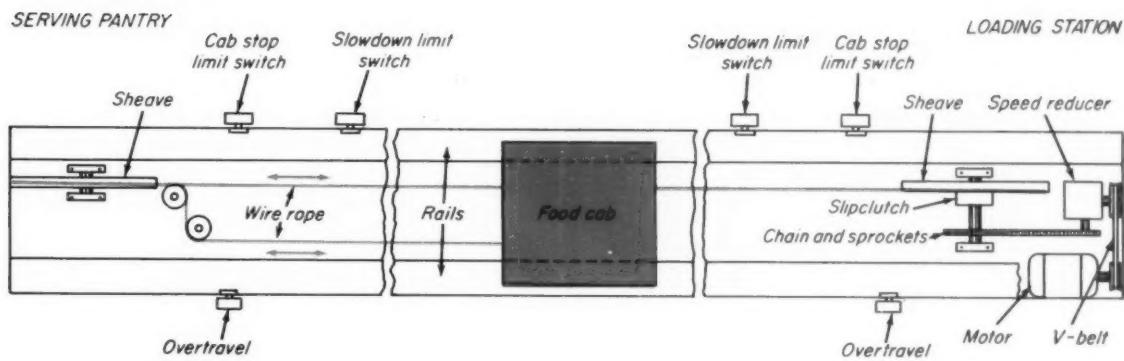
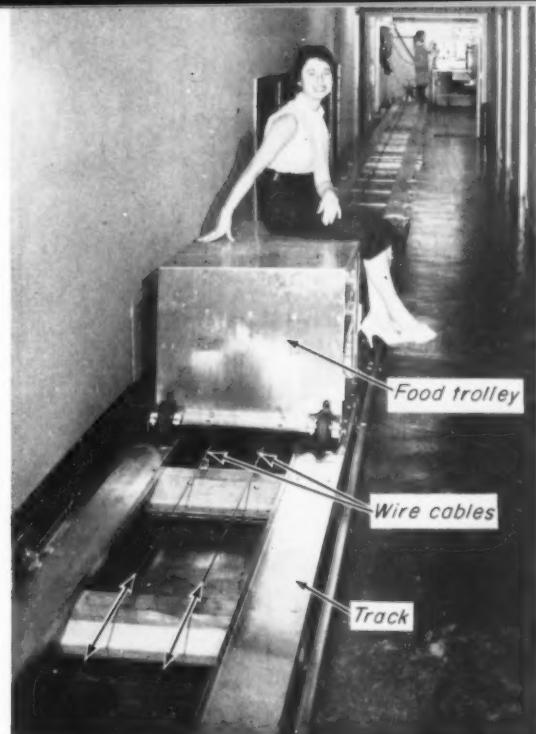
Elevator drive eliminated a pintle chain drive running on 15 ft centers. Although this chain is not as costly as the roller chain, it did have to be replaced every 18 months and the job was troublesome.

Although power cost for the two motors exceeds the savings in fuel oil for the steam engine, the owners—*A. E. Stone Inc.*, Pleasantville, N. J.—feel the savings on maintenance costs far outweigh this. **▲▲▲**

FOOD TROLLEY under test before installation. Cab has three 28 by 50 in. shelves for food and liquids.



DRIVE END of food trolley system.



FOOD TROLLEY SYSTEM DIAGRAM

DC drive keeps cable pull smooth

SMOOTH CONVEYANCE of foods (including liquids in open-top pans) is afforded in a trolley powered by an electronically-controlled adjustable-speed drive. The trolley carries food 110 ft from a loading station to the serving pantry at about 146 fpm.

The trolley is a small four-wheeled platform with sides, and travels on steel tracks. It is pulled along the tracks in both directions by wire rope. The drive sheave is driven by roller chain and sprockets coupled through slip clutch.

The chain drive is from the output shaft of a 13:1 ratio speed reducer. The speed reducer is driven from the dc motor by a V-belt.

The 1/3 hp shuntwound dc motor is supplied by an

electronic control system using thyratron power tubes and selenium rectifiers. Input to the control system is 220 v, 60 cps ac. Six limit switches three at each end of the trolley's travel feed signals to the system for speed control.

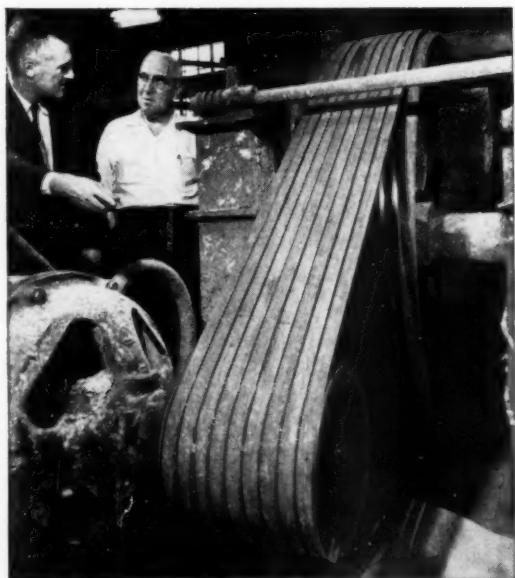
The first switch, positioned 9 ft from the end of travel, causes the trolley to decelerate from 160 fpm to almost zero speed. The next switch brings the trolley to a stop in less than 6 in. Third switch is an overtravel switch which cuts all power to the system if the trolley reaches that position.

System design was by S. Krauss, engineer, Stouffer Corp., Cleveland, Ohio. It is installed in the rooftop restaurant, *Top of the Sixes* in New York City. **▲▲▲**



- **Extreme Length Stability**
- **Eliminates Matching Problems**
- **Controlled Elasticity**
- **Greatest Over-All Strength**
- **New Super Strength Cords**
- **Oil and Heat Resistant***
- **Static Dissipating***

*Super-Thorobred V-Belts



DAYTON BLUE RIBBON SUPER-THOROBREDS save \$13,000 a year in maintenance and lost production time on this pulp beater. With Dayton belts installed these beaters have operated on a continuous 24-hour schedule for well over 2 years with not one moment of downtime due to V-Belt failure.

*The leader in V-Belt development
announces a complete **NEW** line—*

Dayton BLUE RIBBON V-Belts

*with important new gains in **Thorobred** and
Super-Thorobred horsepower capacity*

When you have to increase production, reduce downtime and cut costs all at the same time, the new name to remember in V-Belts is Dayton Blue Ribbon . . . not a redesigned V-Belt line, but a completely new approach to power transmission that only Dayton V-Belt engineers could produce.

Everything's new—from the selection of rubber stocks in the compression and tension sections to the "controllable" synthetic fibres in the strength section and the double-wrapped "High Twist" bias-cut cover that's applied relaxed for maximum give during bending. These exclusive new features give you the best all-around V-Belt line on the market today . . . at budget costs.

New Dayton Blue Ribbon V-Belts cut costs five ways:

- 1. Prolong machine life.** Blue Ribbon Belts absorb machine killing shock loads and vibration . . . protect valuable production equipment.
- 2. Reduce inventory.** Now, belts can be ordered singly or in perfectly matched sets by number alone. Each belt carries its share of the load for longer life and fewer replacements.
- 3. Wider operating range.** Your present sheaves now offer a much greater range of horsepower capacities. No special sheaves required.
- 4. Improved efficiency.** Blue Ribbon Belts operate at less tension, thereby increasing bearing life.
- 5. Increase production.** Long Belt life means less downtime for replacement.

**FOR MORE INFORMATION SEE YOUR YELLOW PAGES
UNDER "BELTING" OR WRITE TO:**



INDUSTRIAL DEPARTMENT

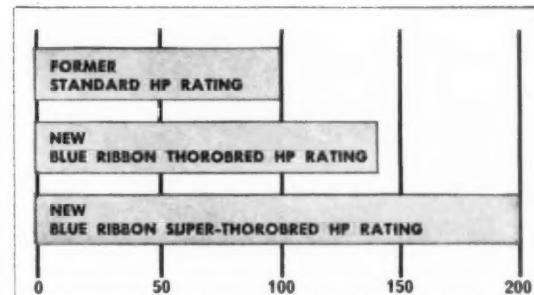
Dayton Industrial Products Co.

Melrose Park, Ill.

A Division of The Dayton Rubber Co.

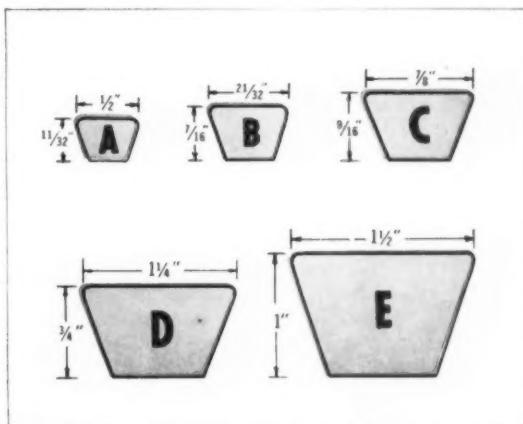
Circle No. 43 on Reader Service Card

FEBRUARY, 1960



New Blue Ribbon Thorobred ratings are 40% higher than previous standard belt ratings.

New Blue Ribbon Super-Thorobred ratings are now 70% to 120% higher than previous standard belt ratings.



Blue Ribbon V-Belts are available in a full range of industry standard sizes.

Thorobred—A through E cross-section

Super-Thorobred—A through C cross-section

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*Please send me a free copy of the
"Handbook of V-Belt Drive Design."*

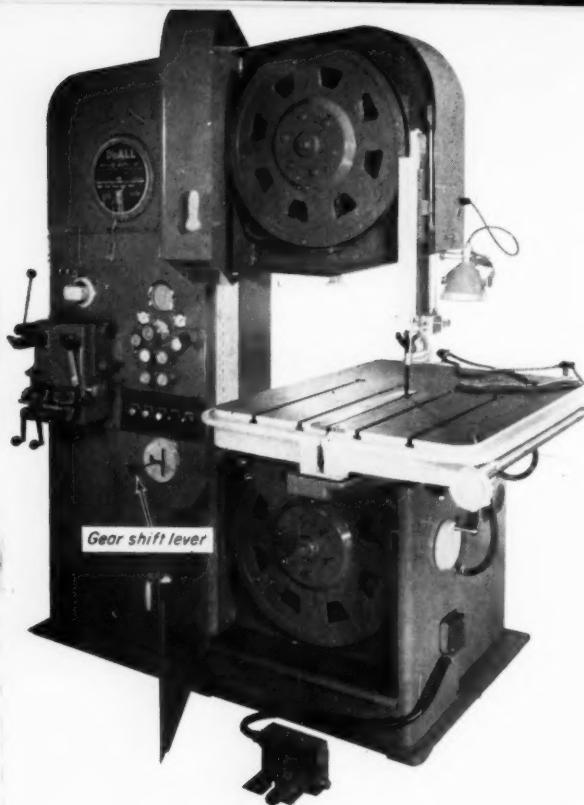
NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____



METAL CUTTING BANDSAW, Model 2613-3 uses overrunning clutch in three-speed gear box to prevent shock loading of gear teeth.

IDEAS
continued

Overrunning clutch

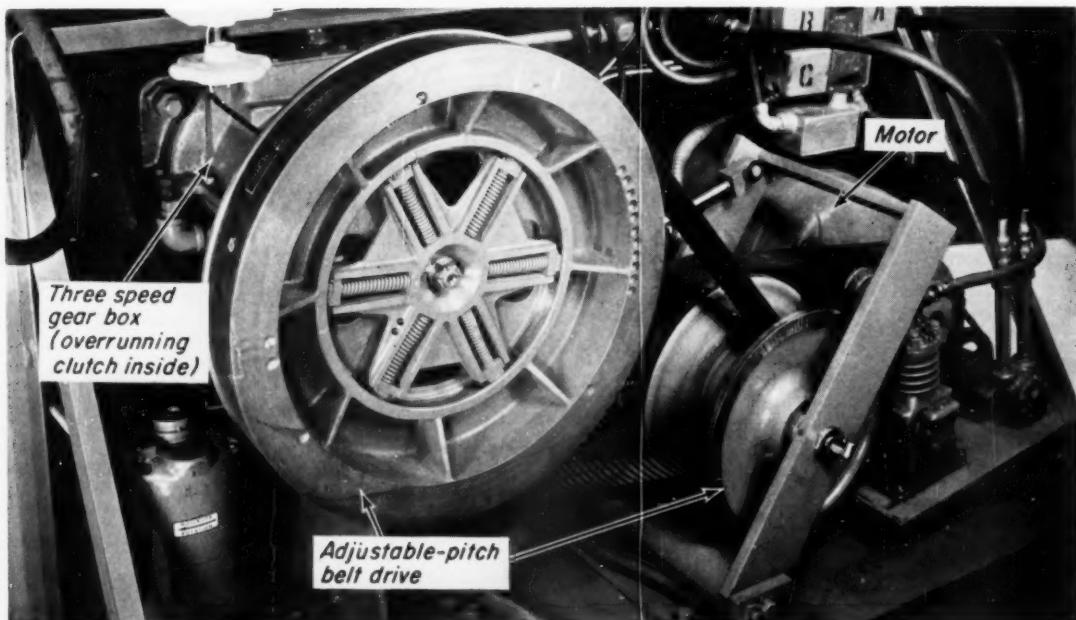
OVERRUNNING CLUTCH built into one of the intermediate gears in a three-speed gear box stops high shock loading. Shock is particularly critical when a downshift is made from high to intermediate speed.

The gear box is manually-shifted. High speed is obtained by connecting the input shaft directly to the output shaft. Intermediate speed gives 6:1 reduction and is obtained by driving from the input shaft to a countershaft through a pair of constant-mesh gears and then back to the output shaft.

The overrunning clutch is in the intermediate gear on the countershaft. Another pair of gears, one on the countershaft and one on the output shaft, give 36:1 reduction for low speed.

When the shift is made from high to intermediate speeds, the overrunning clutch lets the output shaft run ahead of the countershaft and input shaft until speed of the output shaft drops to the speed of the inter-

THREE-SPEED GEAR BOX is driven by variable-speed sheaves to give continuously variable speed in three separate ranges.



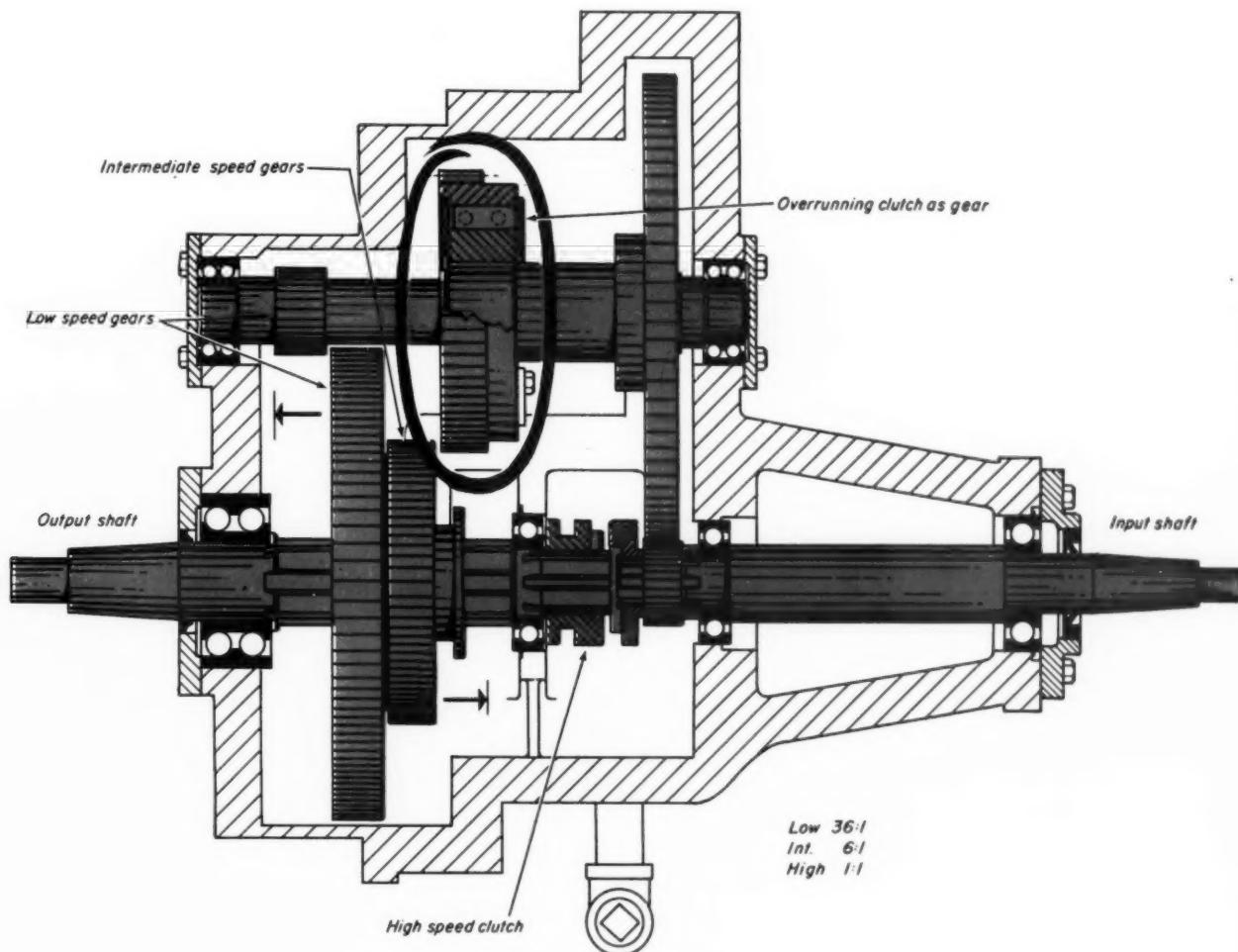
inside gear eliminates gear box shock

mediate gear on the countershaft. Thus there is no shock loading of the intermediate gear teeth.

Three cutting speed ranges are provided on a metal cutting bandsaw by this gear box. Variable-pitch sheaves and V-belts between the drive motor and

gear box give variable speed within each of the three ranges.

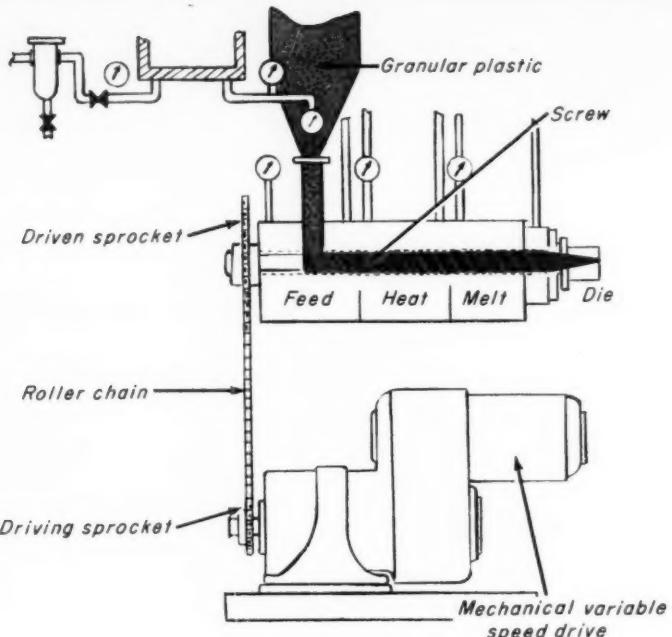
Continental Machines Inc., Savage, Minn., machine tool manufacturing unit of the DoAll organization, builds this machine. **▲▲▲**



OVERRUNNING CLUTCH inside intermediate gear prevents shock loading of intermediate gears in three-speed gear box.

IDEAS
continued

VARIABLE-SPEED DRIVE
rotates extrusion screw
which forces molten plastic
through extruding dies.



Variable speed permits broader die use

BIG AND SMALL dies, and dies of different configuration can be applied to a new plastic extruding machine only because speed of the main drive is variable.

Round shapes, corner moldings, edgings, hollow tubing, and other shapes can be extruded by applying the appropriate die and correct speed.

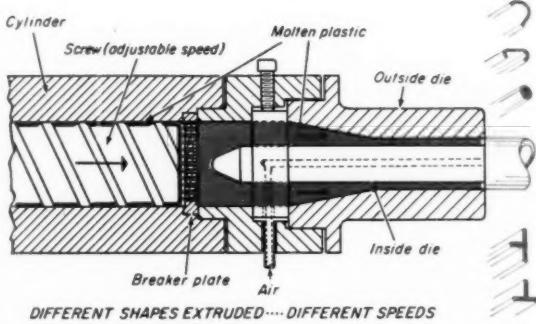
A mechanical variable speed drive near the base of the machine powers an extruding screw. Granular plastic, inserted at the top of the machine, is heated and forced by the screw through the die which forms the finished shape. The extruded shape exits from the machine as a continuous ribbon.

Small shapes, such as a tiny tube with thin wall section, require different speed than a larger shape with more density. Speed adjustment is accomplished manually by adjustment of a dial on the drive housing. Variable-pitch sheaves inside the drive housing change the speed by changing pitch diameter of a belt drive, which changes output speed.

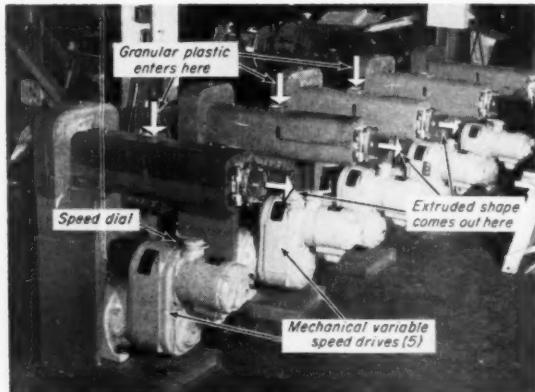
The machine has a plasticizing capacity of 30 to 35 lb or 700 to 800 cu in./hr for most compounds. The screw is 1-1/2 in. dia alloy steel, heat treated, chrome plated with surface-hardened flight lands, hollow-bored for fluid cooling or heating.

The replaceable, forged steel cylinder barrel has 1-1/2 in. dia bore lined with corrosion-resistant Xaloy 306 and is electrically heated between room temperature and 800F. The drive is 3 hp and provides a range between 10 and 70 rpm.

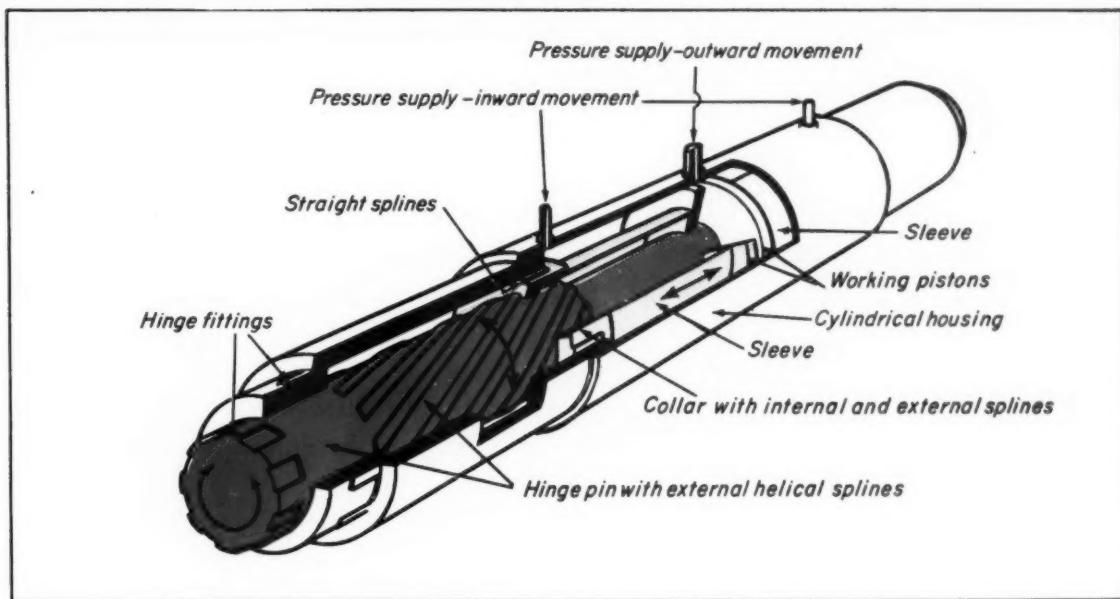
Designed and marketed by National Rubber Machinery Co., Akron, Ohio, the NRM-11/2 plastics Extruder can also extrude different compositions of plastic for wider customer satisfaction. **▲▲▲**



WIDE VARIETY of plastic shapes can be extruded because of speed adjustability.



SEVERAL PLASTICS EXTRUDERS mounted side by side on production floor.



CUTAWAY VIEW of rotary hydraulic hatch cover actuators.

Rotary actuator develops 20 ton-ft torque

COMPACT ROTARY ACTUATORS operate heavy hatch covers aboard a ship by developing 20 ton-ft of torque with 1400 psi hydraulic pressure applied. The actuators take up no more space than normally needed by the hinge pins. They provide 90 deg rotation.

Linear motion of two pistons in each actuator is converted to rotary motion by helical splines. The pistons push against sleeves which have straight splines on their outer surfaces and the helical splines on the inside. Straight splines keep the pistons from rotating. The hinge pin runs through the center of the actuator and projects from both ends. Helical splines on the outer surface of the hinge pin mesh with those on the inner surface of the sleeves and cause the hinge pin to rotate. Straight splines at the ends of the hinge pin are used to connect it to the door.

The hydraulic circuit is very simple. Pressure is applied at the center port of the actuator to open the door. Pilot-operated check valves in the pressure line keep the doors from closing if pressure to the actuator fails. Pressure applied to the two end ports closes the doors. All moving parts of the actuator are lubricated by the hydraulic oil. Little maintenance is therefore needed.

These actuators were designed and built by Gotaverken, Gothenburg, Sweden and are installed on the Norwegian liner M. S. Gudrun Bakke. **▲▲▲**



HATCH COVER actuator installation.



TRANSMISSION BELTS from the Power Unlimited complete belt line

POWER UNLIMITED...

U. S. Rubber's research, development and manufacturing facilities all combine to produce Endless Transmission Belts that fulfill every Power Transmission need. For example:



U.S. POWERGRIP "TIMING" BELT

These belts, invented by "U.S." research and manufactured by the "U.S." unparalleled facilities (in the only plant in the industry devoted exclusively to the production of endless transmission belts), are patented products. They were acclaimed by the Franklin Institute of Philadelphia the greatest power transmission belt invented in this decade.

PowerGrip "Timing"® Belts never stretch. They require no lubricating or maintenance. Operating without tension, they prolong the life of bearings. They are used on drives from fleapower to 1,000 hp. Speeds are from imperceptible to the eye and up to 16,000 f.p.m.

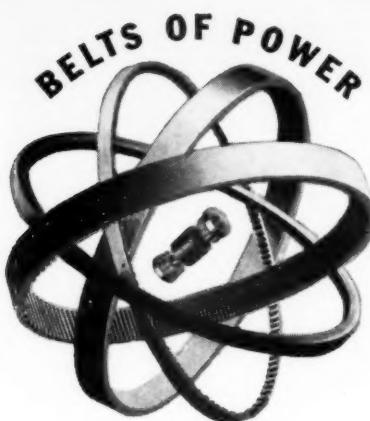
U.S. ROYAL V-BELTS

U.S. Royal V-Belts, with 40% greater h.p., are made by entirely advanced automation and curing processes.

They are without question unequalled for service on multiple transmission drives. Their *length-stability* makes this an undisputed fact. This has been proven in actual plant use in all parts of the country—on the West Coast (Ranchers Cotton Oil Co., Fresno, Calif.), the East Coast (The Ruberoid Co., Gloucester City, N. J.) and in a New England paper-making plant, to point out a few. Any U.S. Royal V-Belt will continue to pull its full share of the load long after one or more of the belts on an ordinary set have given up.

The length-stability of U.S. Royal V-Belts saves you dollars in Time and dollars in INVENTORY.

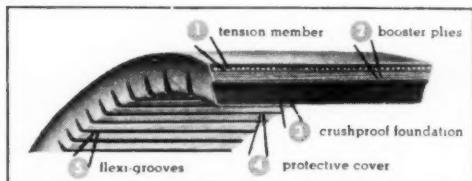




the only complete line of Transmission Belts

PRESS-CURED V-BELTS

The U. S. Royal line, of course, includes sizes larger than 180". These giant size V-belts are built by a new "U. S." process that practically eliminates length variation and greatly reduces belt matching problems.



VARIABLE SPEED BELTS

This Belt is non-squash, non-sag. This is the belt to do away with Variable Speed Belt problems. Hard, rigid rubber encloses soft rubber containing tension members. The *exclusive* and complete rigidity in these belts prevents squashing.

In plant after plant, users find that lengthwise stretch is just about non-existent. *No sagging*. This belt has complete accuracy regardless of speed changes—whether you switch from 2,000 rpm to 10.

U.S. ROYAL SPEEDAGE KORD ENDLESS BELTS

The U.S. Speedage Kord® Endless Belts are for really high-speed service—up to 18,000 f.p.m. Thin enough to operate over pulleys as small as $\frac{1}{2}$ " in diameter. Designed for work on open, serpentine and reverse drives. No seams, splices or laps to cause vibration. Available from stock in a wide range of popular sizes.

SPINNER BELTS

This belt will travel up to 113 mph with no vibration, *no noise*. The reduction in the length of modern spinning machines requires a belt of this high speed. Special "U.S." construction methods make possible building of belt with a minimum of splices, regardless of length. Contamination of yarn is prevented by another unique feature: no rubber on outside surfaces. The belt for uniform twist and smooth spindle operation.

U.S. ROYAL FLAT BELTS

U. S. Spinner Belts are only one type of belt in the U.S. Complete Flat Belt line. "U.S." produces a variety of belts for a multiplicity of services. They each feature a specially woven duck for top strength and tenacity with top-quality friction between plies.

U.S. FLEXIBLE COUPLINGS

Misalignment, whether angular, axial or lateral, is compensated for by this coupling, most versatile ever produced. It provides torsional resilience by angular displacement and insulates both vibrationally and electronically (no metal-to-metal contact).

Design of this coupling is so free of complicated parts that cost is truly low in comparison with other couplings. It will pay you to insist on having these tried on your machinery. The result will be a very desirable reduction in maintenance costs.



The one and only sure way to get expert transmission engineering service is through your U. S. Rubber Transmission Distributor. He stocks the only complete transmission belt line. He never attempts to make one type of belt perform where another type should be used. He is unbiased in seeing that you get the right belt for your needs.

Mechanical Goods Division



United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

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For a money-saving balance

between maximum performance
and moderate cost . . .

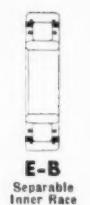


ROLLWAY
Tru-Rol®
BEARINGS

**Give you more for
your bearing dollar**

For those hundreds of in-between applications where performance requirements are more exacting than those provided by the ordinary commercial bearing, but where maximum precision would be unneeded — specify Tru-Rol for the job.

Tru-Rol Bearings provide above-commercial-grade efficiency . . . at worthwhile savings in cost. Internal clearances are closely controlled. Rollers are equally spaced to eliminate out-of-balance vibration. Each roller is crowned to distribute the load evenly along the full length of the roller. Eleven types available in single and double width bearings, in stamped steel retainer, segmented retainer or full roller construction.



E-B
Separable
Inner Race



L-J
Separable
Inner Race



U-B
Non-separable
Bearing



U-J
Non-separable
Bearing

**E L E V E N
T Y P E S
A V A I L A B L E**



L-B
Separable
Bearing



U-R-E
Separable
Outer Race



U-R-L
Separable
Outer Race



LR-U
Separable
Inner Race



E-U
Separable
Inner Race



U-M-B
Non-separable
Full Roller



U-M-J
Non-separable
Full Roller

ROLLWAY
BEARINGS

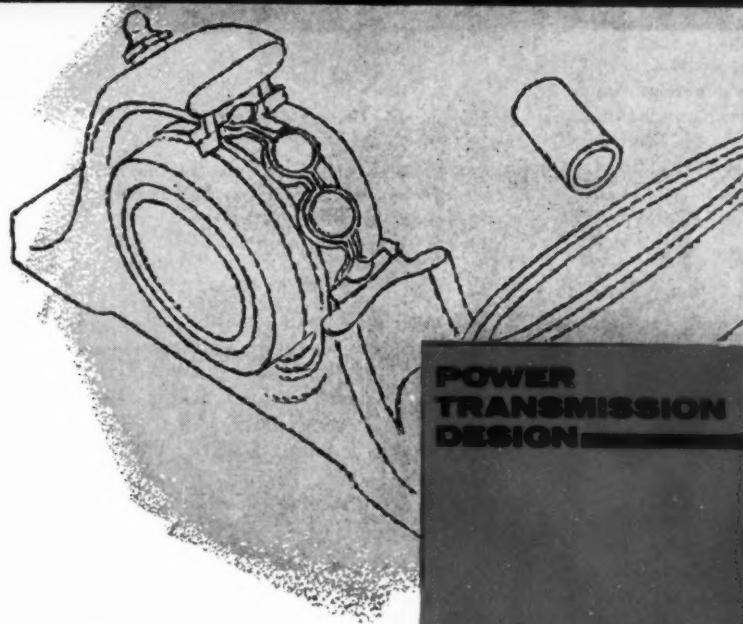
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Chicago • Toronto • Cleveland • Seattle • San Francisco • Boston • Detroit • Pittsburgh • Houston • Philadelphia • Los Angeles
Circle No. 32 on Reader Service Card



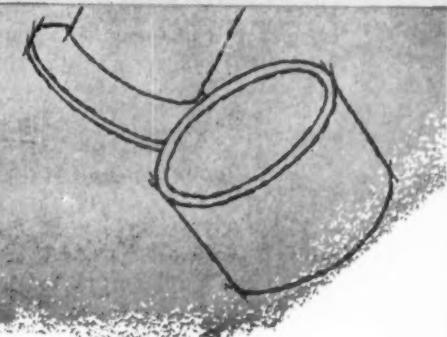
BEARINGS

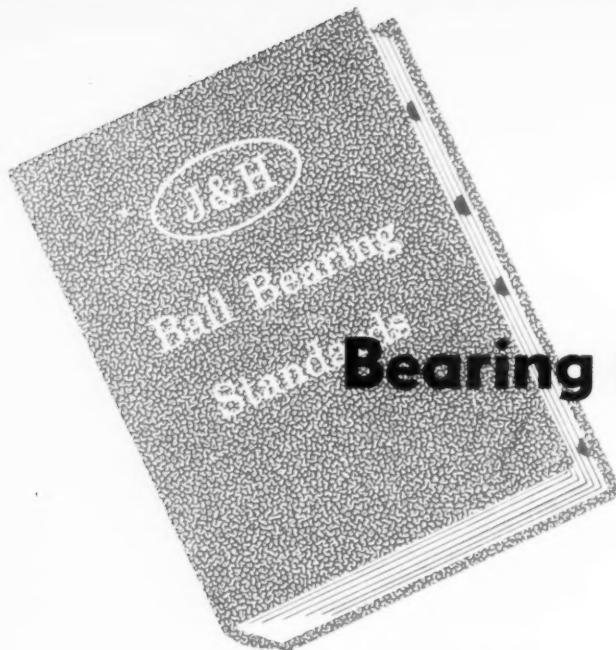
DESIGN / APPLICATION



**POWER
TRANSMISSION
DESIGN**

**REGULAR MONTHLY
SECTION OF IDEAS
AND DEVELOPMENTS**





Bearing standardization—do

DON'T TAKE the chance. Ball bearings are complicated things. Few key men—seasoned designers and engineers, consultants and manufacturers—are really qualified to get into bearing discussions—and ~~selection~~. Why, then, let men who really aren't ~~seasoned~~ in bearings make random selections?

Bearing standardization is a means of listing intimate details about all ball bearings used in a plant by all departments; of cutting down on design, procurement and manufacturing costs; of tabulating much of the knowledge of key bearing specialists who have studied the problems; of raising the standard of knowledge about bearings for all designers and engineers in the plant.

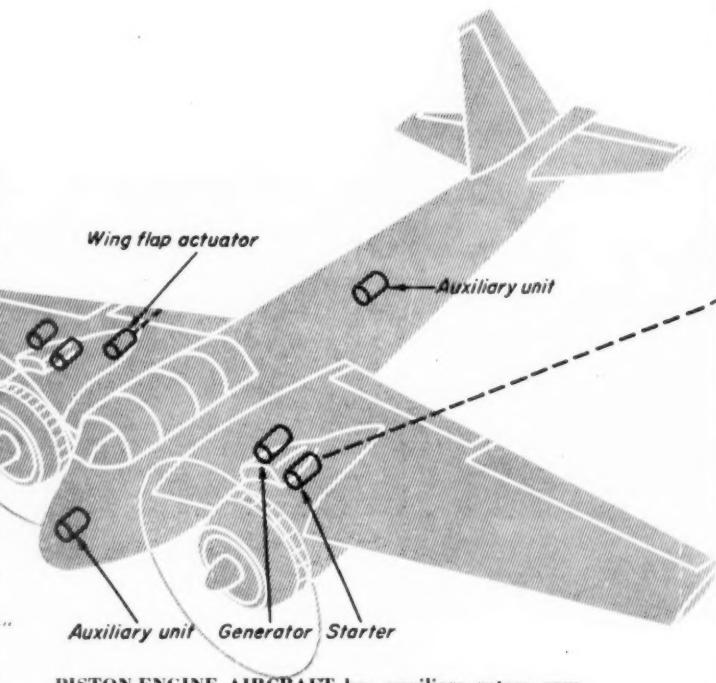
Standardization does not mean that only a listed bearing can be used in a design. The engineers' objectives should be principally to use the manual first. It is important that discretion is not usurped by his having to select a bearing simply because it's listed.

Standardization was initiated in 1955. It was set up with the help of a noted consultant on bearings, Thomas Barish, in conjunction with a qualified J & H materials engineer.

These men, and others, set to work listing, identifying and cross-referencing all ball bearings used in all designs by all engineering departments. Thus, on completion, one composite manual with all this information and much of their knowledge was recorded. The standardization manual is divided into four parts:

Section 1 . . .

. . . contains specific ball bearing data. It contains details about seals, shields, grease, MIL-specs, endplay, snap rings, size, series, etc., for all bearings and is referenced to the type of end product on which each bearing can be used.



PISTON-ENGINE AIRCRAFT has auxiliary rotary components. Those shown have two ball bearings common to each in standardization program.

Section 2 . . .

. . . is a complete interchangeability listing. All bearings are listed by complete part number of major manufacturers and by a J & H number. Thus, a J & H 203-32 bearing shown in this article is a New Departure 99506XR1V; a Marlin Rockwell 206SZZL107E-306A78X6566R; a Fafnir 206PPFS55813.

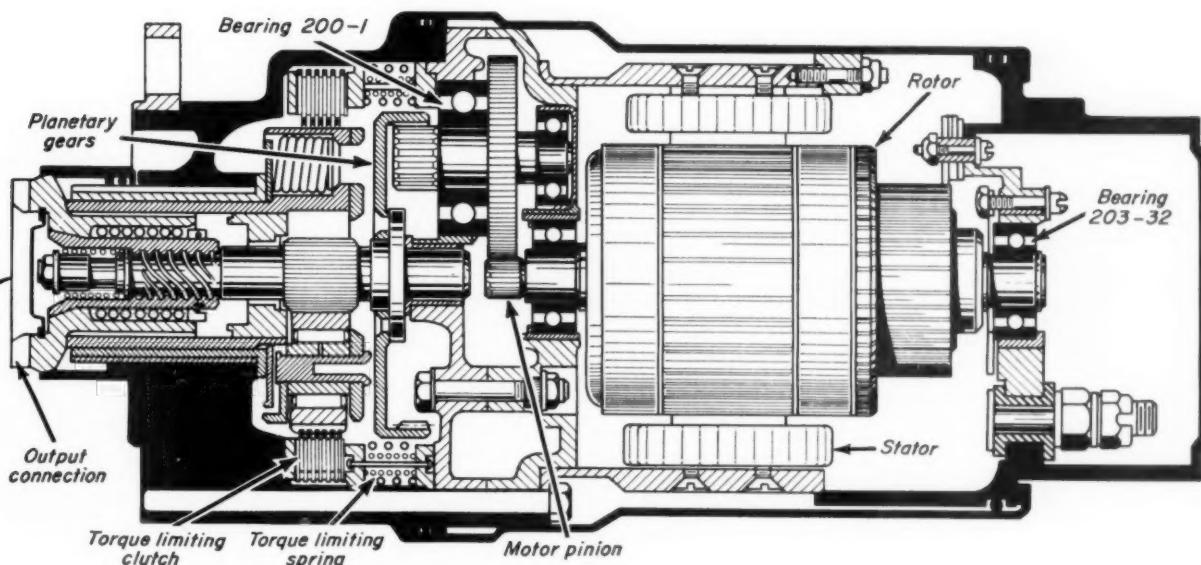
Hundreds of other bearings are also listed and virtually all manufacturers' numbers are shown.

Section 3 . . .

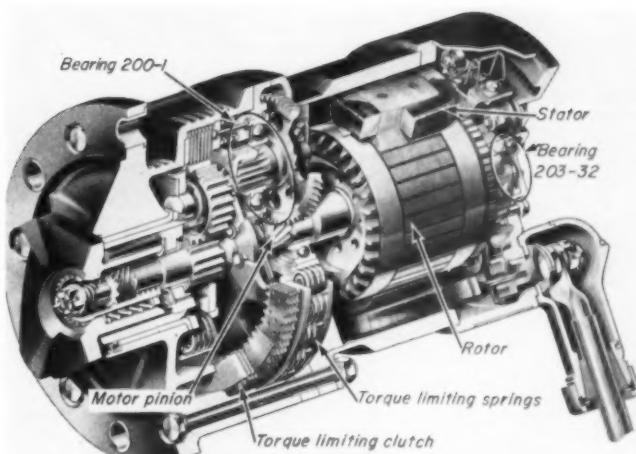
. . . contains quick interchangeable bore, OD and width dimensions for both J & H and manufacturers

your engineers really know bearings?

By C. W. RICHARDSON, *manager, materials and process engineering*,
and R. J. HARTZ, *senior design engineer, Jack & Heintz, Inc.*



STARTER FOR AIRCRAFT engine has quite a few bearings. Two shown are common to other components. Other bearings are also listed in standardization manual; however, designer has discretion of selection whether in manual or not.



BEARING STANDARDIZATION *continued*

numbers. Reference to any bearing shows size, type, grease, class and other information.

Section 4 . . .

. . . contains actual drawings of all the bearings in the manual. All construction features are shown. The bearings take on a realistic visual appearance in which shields, seals, snap rings, cages, races, corner radii, etc., are shown. In addition, complete cross referencing of parts numbers is again tabulated so that bearings can be quickly identified.

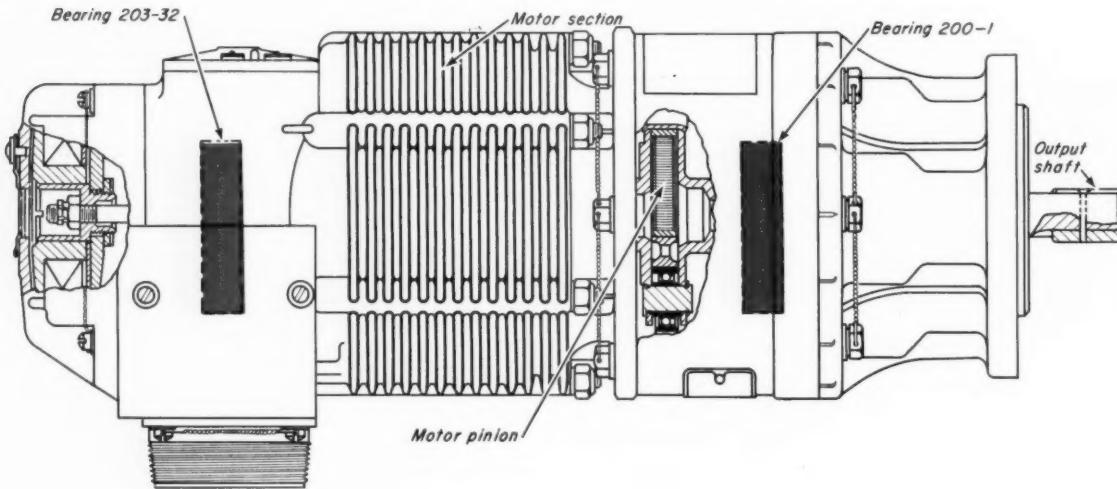
Aircraft Starter

First of the components shown in which the same

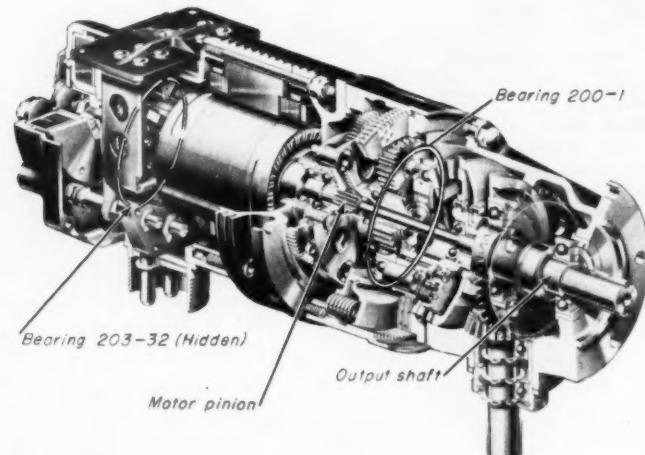
two bearings are used, is a starter for aircraft engines. The starter has a motor that drives through a reduction gear set which cuts out after the engine gets going under its own power.

Both bearings, 203-32 and 200-1, are used in this unit as in the other three. Other bearings are also used and are listed in the standardization manual.

The motor in the starter powers a spur pinion that drives the output shaft through a torque limiting device and planetary gear set. The output shaft has a special locking device that clamps to the engine shaft. A series of clutch discs with ID and OD teeth does the torque limiting and driving. The discs slip if reverse torque to the starter from the engine goes beyond a set amount, such as during backfire. When the engine starts, an override mechanism disengages the motor and gear train.



ROTARY ACTUATOR operates wing flaps on airplane. This and other precision components are designed by different engineering groups within same company. Standardization helps selection.



Rotary Actuator

The wing flaps of aircraft are operated by a rotary actuator which is constructed much like the starter, generator and starter-generator. Design detail, however, is considerably different, and different engineers in different sections specialize on different products.

The same two bearings, J & H 203-32 and 200-1 are used and are common to the other components. The motor operates through a reduction gear set and powers the output shaft at low speed in either direc-

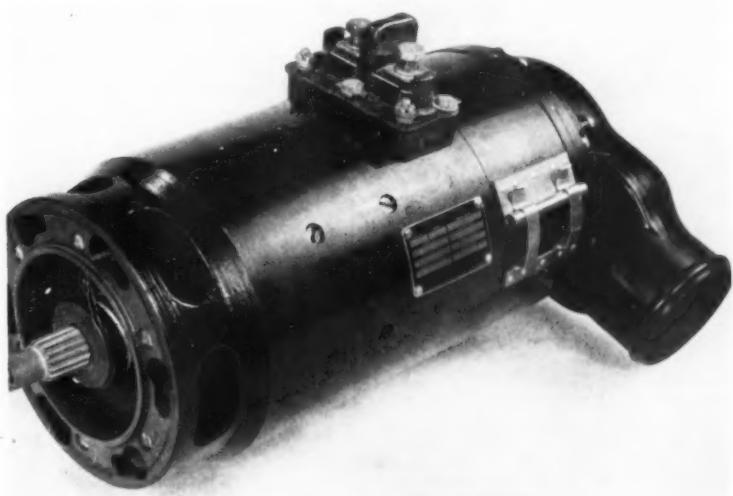
tion. The same torque limiter design is used as in the other units and is engulfed in a special clutch lubricant that controls the amount of friction between the discs and driving faces.

Starter-Generator

An additional development in the aircraft field is the starter-generator. This unit acts as a starter to start the engine, and changes to a generator after starting to supply auxiliary power to the aircraft. **▲▲▲**

INTERCHANGEABILITY LIST

JH PART NO.	MANUFACTURER	MANUFACTURER'S COMPLETE PART NO.
JH200-1	New Departure Marlin Rockwell	77500XIE 200SFFL106E- 306A75X6569R
	Norma Hoffman Hoover	200PTFG75a 77200 M25
JH200-3	New Departure Marlin Rockwell	77502XIE 202SFFL106E- 306A75X6570R
	Norma Hoffman	202PTFG75a
JH200-4	New Departure Marlin Rockwell	77503XIE 203SFFL106E- 306A75X6570R
	Norma Hoffman Fafnir	203PTFG75a 203KDDFS55813
JH200-5	New Departure Marlin Rockwell	477504XIE 204SFFGL107E- 306A75X6571R
	Fafnir Hoover	204KDDGFS55734 77204GM25
JH200-11	Marlin Rockwell Fafnir	1045HL107E- 306A105A542R 4CH-E-5734
JH200-13	New Departure Marlin Rockwell	773L04XIE 104KSFFL104E- 306A75X6571R
	Norma Hoffman	6104PTFG75a
JH200-17	SKF Marlin Rockwell	6910JMT13 1910SL107E- 306A105G937R
JH200-22	SKF Marlin Rockwell	6910Z2ZJLT10 1910SFFL107E- 306A75X6938R



NEW AND IMPORTANT development of company is starter-generator as one unit. Motor acts as starter to start aircraft engine, becomes generator to supply auxiliary power during flight.

INTERCHANGEABILITY LIST BORE DIMENSION VS PART NO.

BORE M.M.	JH PART NO.	I.B.M. NO.	O.D. M.M.	WIDTH M.M.	TYPE	CLASS	LUBRICATION	NOTES
25	JH200-76		52	15	2 shields	1	05-648210	Heat Stabilize 350°F Superseded by JH203-37
	JH203-13		52	15	2 contact seals	3	MIL-L-3545	
	JH203-22		52	15	2 contact seals	1	MIL-G-3278	Heat stabilize -65°F to 350°F. Max. speed - 11,000 RPM Service Superseded by JH200-31 Heat stabilize -65°F to 350°F at 12,000 RPM
	JH203-23		47	12	2 contact seals	1	MIL-G-3278	
	JH203-36		52	15	2 contact seals	3	05-648235	
	JH200-65		52	15	2 shields	1	MIL-L-3545	
	JH200-31		47	12	Plain	1	MIL-C-11796	Class 3
	JH2109-7		52	16.8	2 felt seals	1	MIL-L-3545	
	JH10147-16		52	13/16	2 felt seals	3	MIL-L-3545	
	JH200-59		47	12	Plain	1	MIL-C-11796	Class 3
	JH200-83		52	15	Plain	3	MIL-C-11796	
	JH200-80	07-111315	62	17	2 shields	3	05-648226	
	JH203-26		62	17	2 contact seals	1	MIL-G-3278	
	JH203-37		52	15	2 contact seals	3	05-648232	
	JH2451-2		52	15	1 shield, 1 seal	1	ANDOK-C	
			52	15	Cylindrical Roller	1	MIL-C-11796	Class 3

TWO SPECIFICATION SHEETS removed from 350-page standardization manual. Two bearings are J & H 200-1 and 203-32.

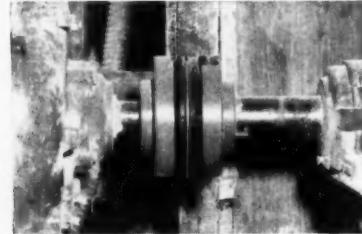
WOOD'S POWER TRANSMISSION PRODUCT NEWS



REVOLUTIONARY NEW VARIABLE

Revolutionary resilient cam follower construction of Wood's new "MCS" motion control, variable speed drives holds constant driven speeds under varying torque loads. Like the "MS," the "MCS" won't freeze or stick. Check oil only once or twice a year. Write for Bulletins 8102, 4101.

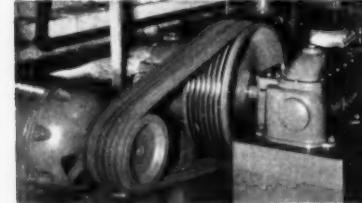
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4-WAY FLEX—UNIQUE DESIGN

Wood's Sure-Flex Couplings absorb 5 to 15 times more shock and vibration than other leading flexible couplings...swallow all types and combinations of angular and parallel misalignment, endfloat. Simple, no wear, no lubrication. Low cost. Write for Bulletin 5103.

Circle No. 46 on Reader Service Card



50% GREATER CAPACITY

New belt materials and manufacturing techniques give you 50% more horsepower from Wood's Sure-Grip V-Belt Drives. These drives are equipped with famous, interchangeable, tapered, QD-type Sure-Grip Bushings which feature standard and reverse mounting for greater adaptability. Write for Bulletin 197.

Circle No. 47 on Reader Service Card

MP/360C



T. B. WOOD'S SONS COMPANY
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CLEVELAND • DALLAS

LITERATURE on drives and components

MAGNETIC CLUTCHES . . . and their applications are covered in an 18-page technical booklet. *PIC Design Corp.*, East Rockaway, L. I., N. Y.

Circle No. 100 on Reader Service Card

DRIVE CATALOG . . . has 56 pages of engineering data and specifications on toothed belts and pulleys, plus stock drive combinations. *Browning Mfg. Co.*, Maysville, Ky.

Circle No. 101 on Reader Service Card

MAGNETIC-PARTICLE CLUTCH . . . said to be a simple, reliable source of power coupling for easily-controlled, high-response operation is detailed in spec sheet 110-7. *Lear, Inc., Electro-Mechanical Div.*, Grand Rapids, Mich.

Circle No. 102 on Reader Service Card

ELECTRIC DRIVES . . . are described in a 68-page catalog, No. 258, which includes more than 8000 ratings on drip-proof motors, squirrel cage motors, gearmotors, speed reducers, right angle gearmotors, and variable speed drives. *Sterling Electric Motors*, Los Angeles, Calif.

Circle No. 103 on Reader Service Card

STEEL ANALYSES . . . are compiled in a 20-page pocket guide, listing compositions of 40 stainless steels, 184 alloy steels, and 105 carbon steels. *Jones & Laughlin Corp., Stainless & Strip Div.*, Detroit, Mich.

Circle No. 104 on Reader Service Card

CONTROL CATALOG . . . GEC-1260D has 72 pages of engineering data on a complete line of control devices. *General Electric Co.*, Schenectady, N. Y.

Circle No. 105 on Reader Service Card

SHOCKPROOF MOUNTS . . . to isolate shock, vibration, and noise caused by impact, rotating, and reciprocating machines are covered in Bulletin 59-04.4. *Barry Controls, Inc.*, Watertown, Mass.

Circle No. 106 on Reader Service Card

TORQUE CONVERTERS . . . for industrial power transmission are described in a 4-page folder. *Clark Equipment Co., Automotive Div.*, Jackson, Mich.

Circle No. 107 on Reader Service Card

MARINE GEARS . . . Bulletin 319 has 6 pages of descriptive data, plus information on engineering and production facilities. *Twin Disc Clutch Co.*, Racine, Wis.

Circle No. 108 on Reader Service Card

FRACTIONAL HP MOTORS . . . for special applications are described in an 8-page catalog. *Lamb Electric Co.*, Kent, Ohio.

Circle No. 109 on Reader Service Card

FLEXIBLE COUPLING . . . Catalog No. 60 has 48 pages of revised data, diagrams, and tables. *Thomas Flexible Coupling Co.*, Warren, Pa.

Circle No. 110 on Reader Service Card

PLASTIC SHIMS . . . and gaskets come in 14 thicknesses, each coded with a different color. An 8-page bulletin, plus color identification chart, gives details. *Artus Corp.*, Englewood, N. J.

Circle No. 111 on Reader Service Card

VARIABLE-SPEED SHEAVES . . . for standard V-belts are illustrated and described in an 8-page bulletin, No. 6102. *T. B. Wood's Sons Co.*, Chambersburg, Pa.

Circle No. 112 on Reader Service Card

MOTOR BROCHURE . . . tells about a line of extreme precision hysteresis synchronous electric motors. *Hysyn Electromotive*, Los Angeles, Calif.

Circle No. 113 on Reader Service Card

POWER UNIT . . . bulletins describe 3-cylinder closed and open diesel and gasoline power units. *Hercules Motors Corp.*, Canton, Ohio.

Circle No. 114 on Reader Service Card

NOW, THE ULTIMATE IN V-BELT DRIVES

WOOD'S *Ultra* DRIVES

SAVE SPACE . . . AS MUCH AS 50%
REDUCE WEIGHT . . . UP TO 27%
CUT COSTS . . . 30% AND MORE



Tremendous savings? You bet they are. And there are more . . . savings on bearings, bases and housings, for instance. Why? Because new, Wood's Ultra-V Drives have exceptional strength and compactness.

New, greatly improved belt materials and new belt construction assure unmatched dimensional stability, amazing strength, greater grip, added support and equalized load for tension members. Belt capacity has been increased radically. Cross sectional areas have been reduced 50% with no loss in belt life. Three Ultra-V Belt cross sections replace 5 of the conventional type, simplifying inventory problems. These compact new belts are oil, heat and exposure resistant and static conducting.

New, high performance, Ultra-V Sheaves have smaller diameters, less width, less weight and tremendous strength. Center distances are reduced. Add to these many advantages the unique features of Wood's Sure-Grip interchangeable bushings. These "easy on—easy off" bushings are the most universally used type. Fewer sizes cover a wider bore range. Reverse as well as standard mounting offers maximum flexibility.

Complete details are contained in Bulletin 9102. Write for your copy.

UV/160

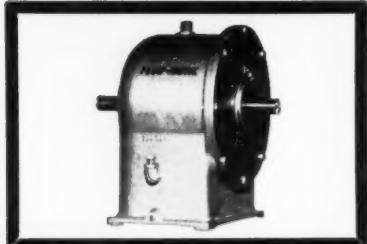


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FLUO-MATIC TORQUE MULTIPLIER is engineered for low horsepower drive requirements—gives the easy operation, smooth power flow, and surging acceleration of modern torque converter drives. Available as a self-contained package unit consisting of a turbine, reaction member and pump in an aluminum housing, or custom units made to specifications.

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Just slide on shaft, bring jaws together and insert cushions. Twist bolts on outside collar and cushions are firmly retained.

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Lovejoy Couplings contain no intricate parts. All are in plain sight for rapid inspection. Lubrication is never required. Water, oil, dirt or weather will not decrease efficiency. The best care for Lovejoy Couplings is to put 'em on shafts and let 'em alone.

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Bodies are machined from electric steel or ductile iron castings. Load is transmitted by cushion compression, eliminating metal-to-metal contact and wear on metal parts and jaws.

Even the cushions last longer: (1) they are furnished in the material best suited to the service, (2) on non-reversing loads, their life can be doubled by reversing or advancing.

Lovejoy Flexible Couplings can be delivered immediately from stock. Request full information and ask for Catalog C-58. Give details or specifications for prompt quotation.

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LITERATURE *continued*

PLANETARY GEARS . . . for speed reduction or speed increasing on high-horsepower transmissions are described in 8-page Bulletin 2401. *De Laval Steam Turbine Co.*, Trenton, N. J.

Circle No. 115 on Reader Service Card

ROTARY COMPONENTS . . . condensed catalog has 20 pages of summarized data on servo motors, motor generators, and synchros. *Kearfott Co., Inc.*, Clifton, N. J.

Circle No. 116 on Reader Service Card

MOTOR GUARANTEE . . . called the "Honor System Motor Service Policy" is explained in literature and sample. *Reuland Electric Co.*, Alhambra, Calif.

Circle No. 117 on Reader Service Card

TANDEM DRIVE MANUAL . . . has 20 pages of data on truck installation of V-belt drives for tandem axles. *Dayton Industrial Products Co.*, Melrose Park, Ill.

Circle No. 118 on Reader Service Card

SPEED REDUCER . . . Bulletin M-140 has 28 pages of specifications and engineering data on flanged and motorized worm gear types. *American Stock Gear Div., Perfection Gear Co.*, Harvey, Ill.

Circle No. 119 on Reader Service Card

BEARING BLOCKS . . . and take-ups Book 2707 contains complete data on babbitt and bronze types. *Link-Belt Co.*, Chicago, Ill.

Circle No. 120 on Reader Service Card

CUT GEARS . . . of all types are offered in a brochure. *D. O. James Gear Mfg. Co.*, Chicago, Ill.

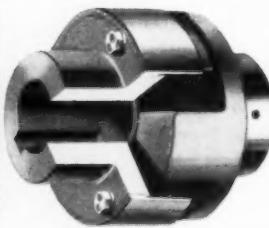
Circle No. 121 on Reader Service Card

SPRING LOADED PULLEYS . . . and adjustable motor bases are described in Bulletin SL-1. *Maurey Mfg. Corp.*, Chicago, Ill.

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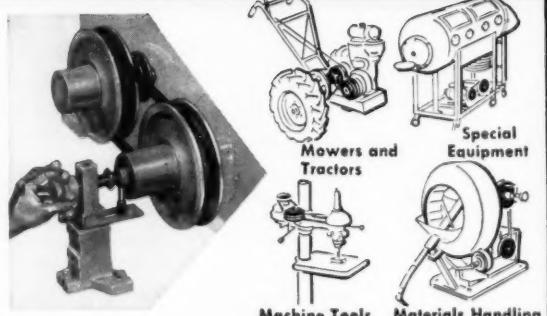
GEAR FACILITIES . . . for producing gears made to customer specifications are outlined in a bulletin. *Adams Co.*, Dubuque, Iowa.

Circle No. 123 on Reader Service Card



SPEED SELECTOR VARIABLE PITCH SHEAVES

Control Speeds on
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Wide Speed Range! Low Cost Sheaves

Speed Selector Sheaves can give your machines or equipment extra wide-range speed control on fixed centers. Efficient, rugged, simple to use — low in cost! Write for illustrated Bulletin.

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Circle No. 35 on Reader Service Card

POWER TRANSMISSION DESIGN

GEAR DRIVES . . . and couplings of various types are illustrated, with condensed descriptions, in Bulletin 20,000. *Falk Corp.*, Milwaukee, Wis.

Circle No. 124 on Reader Service Card

FLEXIBLE MOUNTINGS . . . for engines are discussed in the current issue of *Dynafacts*, 12 pages. *Lord Mfg. Co.*, Erie, Pa.

Circle No. 125 on Reader Service Card

AUTOMATIC CLUTCHES . . . and transmissions are described in a product facilities brochure. *Salsbury Corp.*, Los Angeles, Calif.

Circle No. 126 on Reader Service Card

DYNAMIC BRAKING . . . of squirrel cage and hysteresis synchronous induction motors is discussed in the current issue of the *Motorgram*. *Bodine Electric Co.*, Chicago, Ill.

Circle No. 127 on Reader Service Card

GEAR COUPLINGS . . . of a new flexible type are described in a 20-page catalog, No. C-5. *Sier-Bath Gear & Pump Co., Inc.*, North Bergen, N. J.

Circle No. 128 on Reader Service Card

V-BELTS . . . in multiple and fractional hp sizes are listed in Catalog V-594. *Republic Rubber Div.*, Youngstown, Ohio.

Circle No. 129 on Reader Service Card

TRANSMISSIONS . . . for constant torque drives are included in Bulletin 10051-H. *Oilgear Co.*, Milwaukee, Wis.

Circle No. 130 on Reader Service Card

DIE CAST GEARS . . . and pinions for small, light-load gearing problems are described in a 10-page catalog. *Gries Reproducer Corp.*, New Rochelle, N. Y.

Circle No. 131 on Reader Service Card

MINIATURE BALL BEARINGS . . . made from extra-clean, vacuum-melt 440C stainless are said to have superior finish which gives supersensitive bearings with low torque values. A 4-page catalog gives details. *Fafnir Bearing Co.*, New Britain, Conn.

Circle No. 132 on Reader Service Card

PLASTIC BELTING . . . called Dixylon is said to give outstanding transmission performance at very high speeds. It's described in a 12-page catalog. *R. & J. Dick Co., Inc.*, Totowa, N. J.

Circle No. 133 on Reader Service Card

CLUTCH BULLETIN . . . includes typical clutches, power take-offs, and gear-reduction units, with specifications. *Rockford Clutch Div., Borg-Warner Corp.*, Rockford, Ill.

Circle No. 134 on Reader Service Card

PILLOW BLOCK BEARINGS . . . and mountings, applications, variations, lubrication, and installation are described in 40-page Catalog 51-59. *Triangle Mfg. Co.*, Oshkosh, Wis.

Circle No. 135 on Reader Service Card

SPEED REDUCERS . . . for every drive application are described in Catalog 155. *Winsmith, Inc.*, Springville, N. Y.

Circle No. 136 on Reader Service Card

FLOATING DISC CLUTCHES . . . available in single and double types, wet or dry, are covered in a bulletin. *Carlyle Johnson Machine Co.*, Manchester, Conn.

Circle No. 137 on Reader Service Card

SCREW CONVEYOR DRIVE . . . said to offer the maximum of service, versatility, operating economy, and long life is detailed in Bulletin 7106. *Falk Corp.*, Milwaukee, Wis.

Circle No. 138 on Reader Service Card

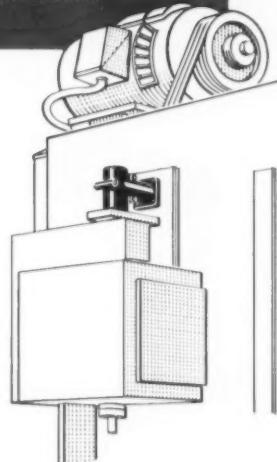
CLUTCH AND BRAKE . . . combination is air-operated, compact, fast-acting, and perfectly synchronized. Bulletin CFC-54 gives details. *Minster Machine Co.*, Minster, Ohio.

Circle No. 139 on Reader Service Card

ANGLgear
simplifies

switch

installation



Drawing based on photo shows ANGLgear drive for rotary limit switch on 75-ton Niagara punch press. ANGLgear's compactness and universal mounting feature helped simplify design of entire switch installation.

Ease of mounting was one of several important reasons why Niagara Machine & Tool Works, Buffalo, N. Y., selected ANGLgear to drive the rotary cam limit switch on its Series F power presses. ANGLgear can be mounted four different ways—so it can easily be designed into almost any power transmission system.

Other ANGLgear features that impressed Niagara engineers were compactness, quality construction, and precision gearing. Also ANGLgear cost less than other right-angle drives considered.

If you work with mechanical power transmission, there is an excellent chance that standardized ANGLgear can help you simplify design and reduce costs wherever 90° power takeoff is involved.

Completely enclosed, permanently lubricated, ANGLgear is available from stock in 1/4, 1, 2 1/4 and 5 hp ratings, with 1:1 or 2:1 gearing, and 2 or 3-way shafting.

See our literature in *Sweet's Product Design File* or contact your local distributor.

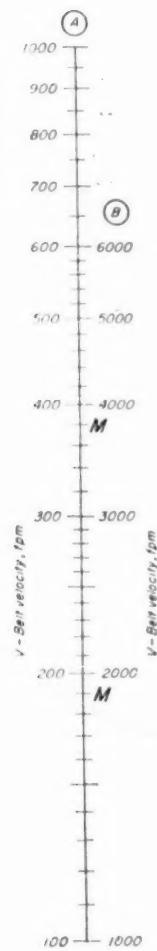
AIRBORNE
Engineered Equipment for Aircraft and Industry
AIRBORNE ACCESSORIES
CORPORATION
HILLSIDE 5, NEW JERSEY
Circle No. 2 on Reader Service Card



REFERENCE FILE

Six nomograms for complete mounting

NOMOGRAM 1



Horsepower transmitted by V-belt drive is given by:

$$HP = \frac{V(T_1 - T_2)}{33000} \quad \dots \dots (1)$$

Belt tension ratio is:

$$R = \frac{T_1}{T_2} = e^{\left(\frac{\mu \theta}{\sin \phi} \right)} \quad \dots \dots (2)$$

Angle of contact between belt and pulley is:

$$\theta = 180^\circ \pm 2 \sin^{-1} \left(\frac{D - d}{2C} \right) \quad \dots \dots (3)$$

Negative sign is used to calculate θ for smaller pulley.

The relationship among the variables in a pivoted-motor mounting can be expressed as

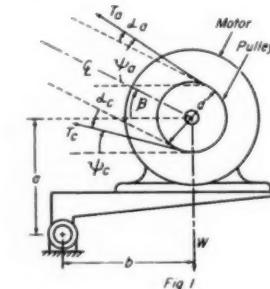
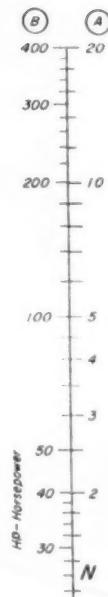
$$\begin{aligned} \frac{b}{d} &= \frac{\frac{a}{d} \cos \psi_a + \frac{1}{2} + \frac{T_c}{T_a} \left(\frac{a}{d} \cos \psi_c - \frac{1}{2} \right)}{\frac{W}{T_a} - \sin \psi_a - \frac{T_c}{T_a} \sin \psi_c} \\ &= \frac{\frac{T_c}{T_a} \left(\frac{a}{d} \cos \psi_c - \frac{1}{2} \right)}{\frac{W}{T_a} - \sin \psi_a - \frac{T_c}{T_a} \sin \psi_c} \end{aligned} \quad \dots \dots (4)$$

Then if

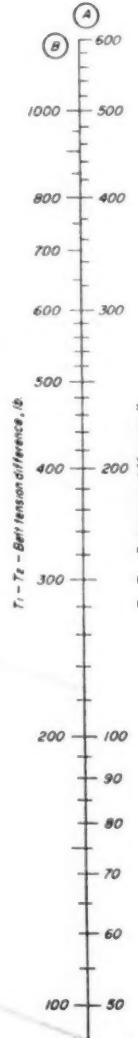
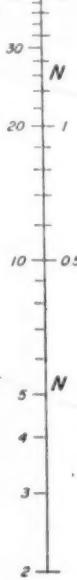
$$\begin{aligned} Q_1 &= \frac{a}{d} \cos \psi_a + \frac{1}{2} \\ Q_2 &= \frac{T_c}{T_a} \left(\frac{a}{d} \cos \psi_c - \frac{1}{2} \right) \\ K_1 &= W/T_a \\ K_2 &= \sin \psi_a \\ K_3 &= \frac{T_c}{T_a} \sin \psi_c \end{aligned}$$

Equation 4 becomes:

$$\frac{b}{d} = \frac{Q_1 + Q_2}{K_1 - K_2 - K_3} = \frac{Q}{K} \quad \dots \dots (5)$$



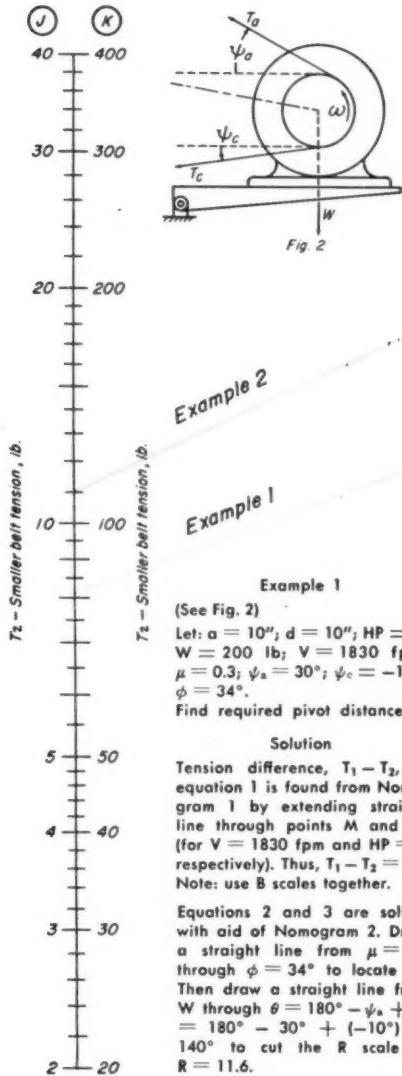
$$HP = \frac{V(T_1 - T_2)}{33000}$$



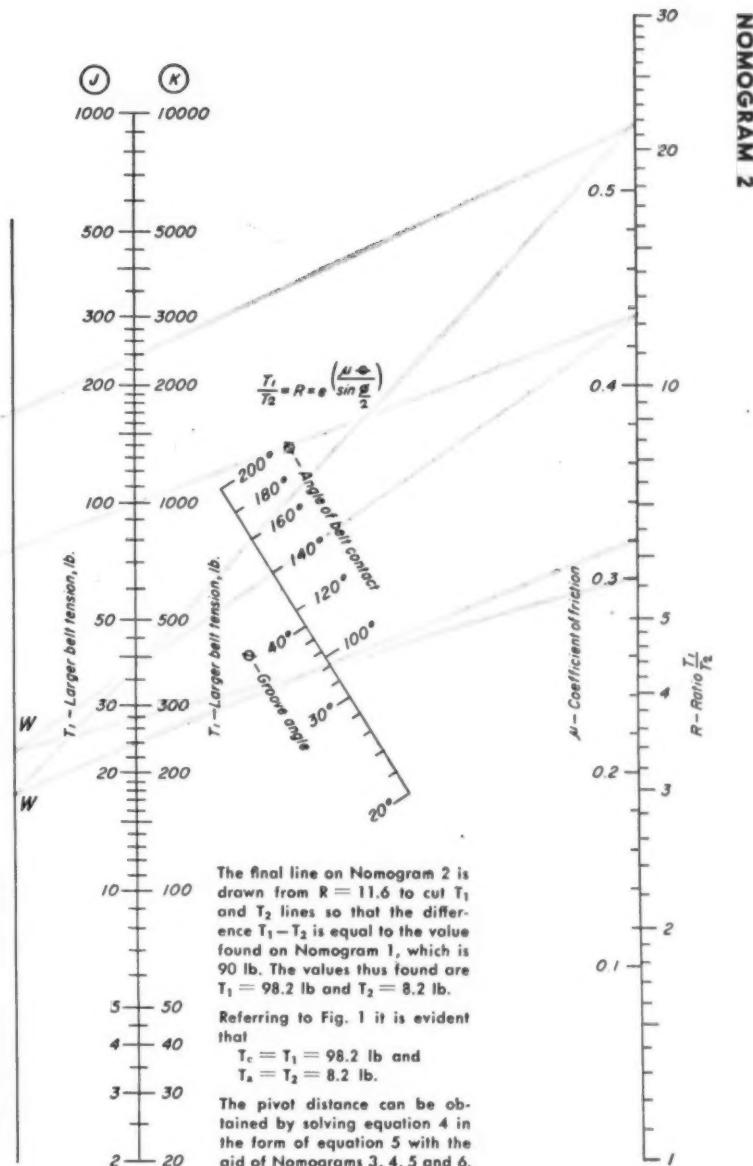
By J. N. ARNOLD, professor, and
ALLAN C. DUNK, assistant professor, Purdue University

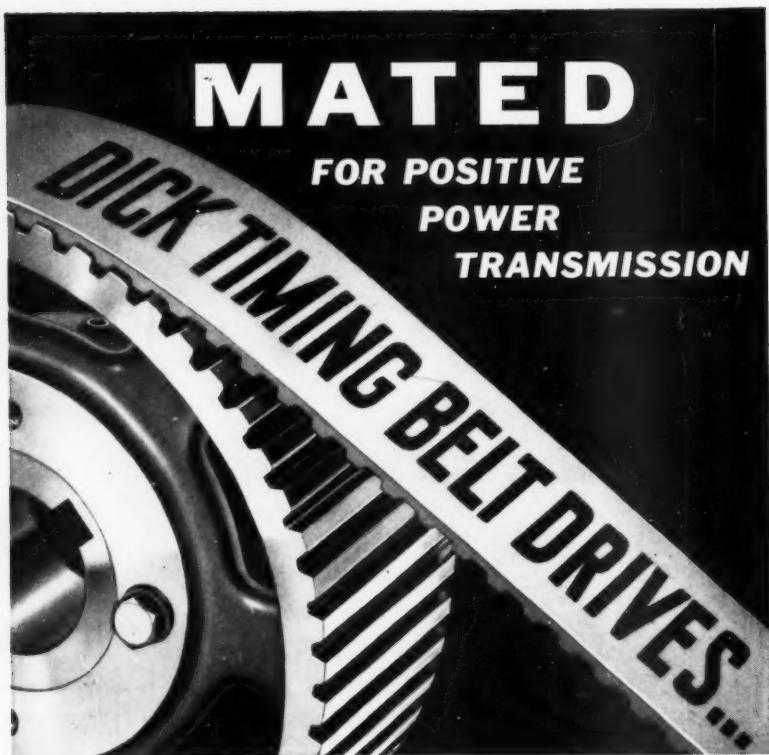
Part 1
See next two
issues for other
four
nomograms

of pivoted motor, base and accessories



For free copies of all six nomograms, Circle No. 250 on Reader Service Card





Rugged nylon faced neoprene teeth silently grip the mating sprocket, and give the revolutionary power transmission action of Dick Timing Belt Drives. When designing a machine, or selecting a drive, check their advantages, including:

Positive, Non-Slip Transmission of Power—No Lubrication—Minimum Friction and Backlash—Constant Angular Velocity—Compact Design—Quiet, Lightweight—Wide Speed Range—Economical Operation.

Made in range from sub-fractional h.p. to heavy-duty drives of 600 h.p., and more. Belts reinforced with steel cable. Dick "QD" pulley hubs give a solid grip on the shaft, provide for easy installation and removal. Send coupon for engineering manual containing complete information.

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PRODUCTS

continued from page 34

Miniature bearings

A line of precision miniature instrument bearings is made of sintered bronze per MIL-B-5687, Type I, Comp. A, with 4% molybdenum disulphide added at sintering. They



are oil-impregnated and available in standard miniature sizes, both flanged and non-flanged.

Northfield Precision Instrument Corp., Island Park, L. I., N. Y.

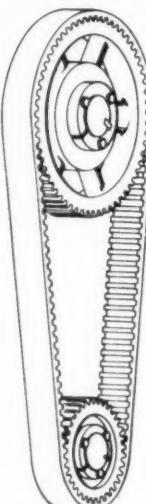
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High-response actuator

Electric rotary valve actuator is said to have high accuracy and high response for control of hydraulic valves and process control. It measures 4 1/2 in. in diameter, 5 in. long, and develops torques of 125 lb-in. The actuator features fully-enclosed and lubricated gear trains, weatherproof construction, choice of power supplies, and a motor with ample heat sink to permit continuous operation at locked rotor current.

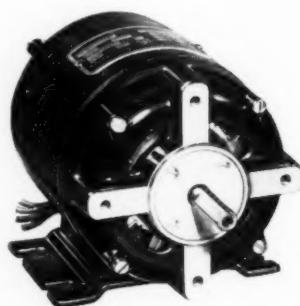
Jordan Controls, Inc., Milwaukee, Wis.

Circle No. 206 on Reader Service Card



End-mounting endshield

An end-mounting endshield is available for Bodine Type N-1 motors, permitting ventilating air to pass into the motor without using separate



POWER TRANSMISSION DESIGN

Aetna
ROLLER BEARINGS

True Crowned for 15% longer service life

Because each Aetna roller is *True Crowned* with a large radius, high stress points in the rollers are relieved—giving 15% longer bearing life. The crown radius is scientifically determined and varies with the roller size.

Aetna offers a wide range of self-contained *True Crowned* pure radial roller bearings in both custom and standard designs—also many special designs of both pure radial and pure thrust bearings for unusual applications.

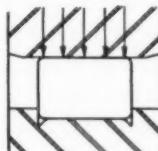
For complete information on *True Crowned* Aetna Roller Bearings, call your Aetna representative listed in your classified telephone directory, or write for General Catalog and Engineering Manual.



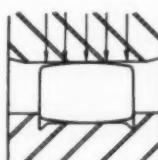
ANTI-FRICTION SUPPLIERS TO LEADING ORIGINAL EQUIPMENT MANUFACTURERS SINCE 1916
Circle No. 6 on Reader Service Card



True Crowned as
produced by Aetna.



Straight roller showing stress pattern
at roller to race contact.



True Crowned roller showing stress
pattern at roller to race contact.

AETNA BALL AND ROLLER BEARING COMPANY
DIVISION OF PARKERSBURG-AETNA CORPORATION

4600 SCHUBERT AVE.
CHICAGO 39, ILL.

Browning

BEARING UNITS

with Malleable Housings
now available in **RELUBE TYPE**



When you need a relube type bearing unit, you can get more compact design and lighter weight by specifying Browning. Reason: these new pillow blocks, flange blocks and take-up units have housings of *unbreakable malleable*, which is stronger and virtually indestructible even under the most punishing loads. The new relube type units feature self-aligning ball bearings secured to the shaft by two set screws in the wide inner ring. All have elongated bolt slots for wide adjustment and maximum interchange. Available in 29 shaft sizes from $\frac{1}{2}$ to $2\frac{7}{16}$ ". New catalog BU-103 containing complete details is available on request from your Browning distributor. Or write to Browning Manufacturing Company Maysville, Kentucky.

Browning

POWER TRANSMISSION EQUIPMENT

BEARING UNITS V-DRIVES PAPER PULLEYS COUPLINGS CHAIN DRIVES

Circle No. 10 on Reader Service Card

PRODUCTS *continued*

spacers between the motor and the mounting surface. The mounting surface is no longer in diameter than the body of the motor.

Bodine Electrical Co., Chicago, Ill.

Circle No. 207 on Reader Service Card

Miniature reducers

Compact reducers are approximately 15/16 in. in diameter, made to MIL specifications, size 10 frame, and have ratios from 9:1 to 3000:1.



Maximum rated output torque is 35 oz.-in., the backlash through the entire train is less than 30 minutes measured at output shaft, and gears are cut to Precision 2 or better.

PIC Design Corp., East Rockaway, L. I., N. Y.

Circle No. 208 on Reader Service Card

Plastic ball bearing

Made completely of plastic, a ball bearing has inner and outer races of nylon or glass-filled teflon, and nylon and pyrex glass-filled balls. The bearing is non-conductive, light weight, durable, and said to be suited for use immersed in water and oil.

Reid Enterprises, Inc., Long Beach, Calif.

Circle No. 209 on Reader Service Card

Heavy-duty coupling

Model GHF flange-type coupling, for heavy duty, ranges in sizes from 35 to 700 hp at 1800 rpm, for shafts up to $5\frac{1}{2}$ in. diameter. Consisting of two metal bodies with interlocking



POWER TRANSMISSION DESIGN

OIL SEALS in Design Engineering



KLOZURE Oil Seals are available with (a) finger spring, (b) with combination finger and garter spring, (c) with garter spring, (d) bonded springless, and (e) split.



SELECTING THE SEALING ELEMENT

Efficient and durable oil seals in your product depend largely on selection of the proper sealing element. Following are several KLOZURE* elements that Garlock offers for different applications:

Nitrile Rubber Elements. This special compound is standard on Garlock KLOZURES. Oil resistant, tough, resilient, and free running, it withstands temperatures from -40° to $+250^{\circ}$ F constant.

Silicone Rubber Sealing Elements used in Garlock KLOZURE oil seals have excellent resistance to low-swell mineral oils and some chemicals. Temperature range from -70° to $+450^{\circ}$ F.

Viton Sealing Elements.** This new synthetic rubber by DuPont resists oils, fuels, and solvents from -20° to $+400^{\circ}$ F. Has low compression set, good tensile strength, resists ozone, oxygen and weathering.

Teflon Sealing Elements** resist all fluids except molten alkali metals and fluorine at elevated temperatures. Recommended for use where the KLOZURE will contact strong acids or other corrosive fluids at temperatures from -110° to $+500^{\circ}$ F.

Whatever your application, designing with Garlock KLOZURE Oil Seals makes good sense. You are assured of consistent high quality and proper design recommendations.

For prompt service contact one of our 26 sales offices and warehouses throughout the U.S. and Canada, or write for Klosure Catalog 30, The Garlock Packing Company, Palmyra, N. Y.

G A R L O C K

Canadian Division: The Garlock Packing Co. of Canada Ltd.

Plastics Division: United States Gasket Company

Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded & Extruded Rubber, Plastic Products

*Registered Trademark

**DuPont Trademark

Circle No. 23 on Reader Service Card

FEBRUARY, 1960



WAIT!

is this design step really necessary?

Your problem power transmission component may already have been engineered by Charles Bond Company! Power transmission users the country over find it saves time and money to check with Bond first.

Time and again a review of the facts reveals that proven Bond stock components solve the problem without resorting to a new engineering approach, expensive dies and costly delay.

Bond's more than 60 years of manufacturing power transmission equipment has made it routine to specify our components for a great variety of design applications.

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PRODUCTS continued

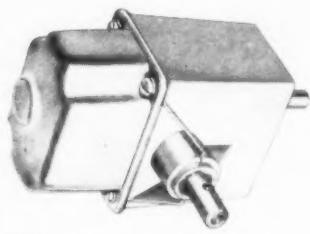
jaws separated by non-metallic load cushions, it has removable individual inserts held in place by a steel collar to provide easy inspection or replacement without disturbing driving or driven units. There's no metal-to-metal contact, and no lubrication is needed.

Gerbing Mfg. Corp., Elgin, Ill.

Circle No. 210 on Reader Service Card

Right-angle gearbox

Suited for light-duty operations in conjunction with gasoline engines, a



right-angle gearbox has a 7/16-in. input shaft and 1/2-in. output shaft, 3:1 ratio. Overall dimensions are 6 1/2 x 4 5/8 x 3 1/2 in., with four mounting holes on 2 9/16 x 1 19/32 in. centers.

Micro Gear, Inc., Prophetstown, Ill.

Circle No. 211 on Reader Service Card

Self-aligning bearings

Self-aligning spherical bearings have a low coefficient of friction (.04) without use of lubricants. Teflon-fabric is bonded directly to the outer raceway, providing chemical inertness with a low-friction, non-sticky surface. These bearings are said to be suited for low surface speeds, high unit loads, or applications which are subject to high dynamic loading where metal-to-metal life is limited by fretting or brinelling.

Radial Bearing Corp., Danbury, Conn.

Circle No. 212 on Reader Service Card

High-temperature seal

A self-contained mechanical seal, suitable for temperatures to 450 F, resists pressure differentials in one or both directions to 30 psi at shaft speeds to 15,000 fpm. Its compact design is said to take very little axial

space. Available for shaft sizes from $\frac{1}{2}$ to 8 in., it will retain water, gases, and any type of lubricant with viscosity ranging from kerosene to heavy greases. The enclosed seal assembly revolves with the shaft with a two-point static shaft contact, making shaft scoring or wear impossible.

Universal Grinding Corp., Seal Div., Cleveland, Ohio.

Circle No. 213 on Reader Service Card

Multi-shielded motors

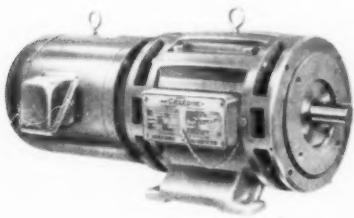
Standard drip-proof motors with full overload characteristics have been designed to operate under adverse conditions of continuous and excessive moisture, high humidity and temperature, salt spray, dust, oil, and chemically contaminated atmospheres. Flexible insulation is with a special silicone sealing compound. The motors are available in all ratings from $\frac{1}{2}$ to 50 hp, any phase, frequency or voltage, torque or slip characteristics, and with multi-speed winding.

Sterling Electric Motors, Los Angeles, Calif.

Circle No. 214 on Reader Service Card

Clutch-brake units

This series of modular package clutch-brake units now has an optional internal spline drive system for unusually heavy torsional reversals, shock loads, and vibration.



Units with spline drives are available in five sizes, for requirements from $\frac{1}{2}$ to 50 hp.

Cycledynamics Inc., Detroit, Mich.

Circle No. 215 on Reader Service Card

Revolution counter

A miniaturized, shaft-driven revolution counter counts shaft revolutions up to 1000 rpm and requires only $1\frac{1}{4}$ oz-in. torque for electrical control. Repeatability is within .0025 of dial range. Knob-operated setting hand determines number of input

FOR OEM

- Controlled single or multiple cycling within a wide range of speed.
- Clutch and brake in a single synchronized unit.
- Adaptable to mounting on crank, cam or drive shaft for flywheel or geared applications.
- Can be used with flywheel, gear or drive-spider and mounted outboard or between bearings.
- Constant or variable clutch torque.
- Compact, space-saving, easily installed.
- Minster Electrical Controls to your requirements.

Write for OEM Clutch Bulletin CFC-54.

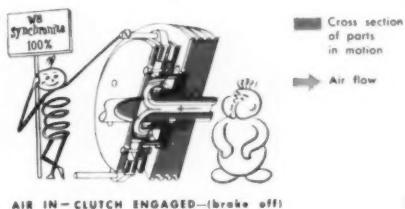
Combination Clutch and Brake

Air-Operated • Compact

Fast Acting • Perfectly Synchronized

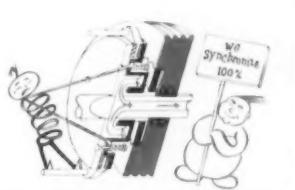


RUN



AIR IN - CLUTCH ENGAGED - (brake off)

STOP



AIR OUT - BRAKE APPLIED - (clutch disengaged)

FOR PRESS CONVERSION

A Minster clutch conversion is the most profitable way to increase press efficiency. It eliminates downtime . . . reduces maintenance and parts replacement . . . increases die life . . . reduces operator fatigue . . . improves safety and increases production.

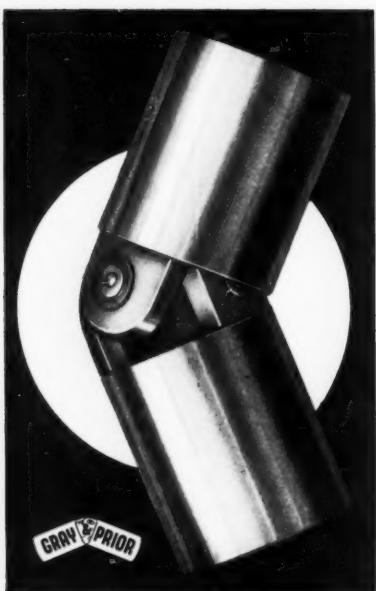
Minster conversion units, made by a press manufacturer who knows your problems, are standard clutches individually applied to your press. Complete with flywheel and shaft, ready to drop in place. Thousands in daily use.

Write for Clutch Conversion Booklet CC57.

THE MINSTER MACHINE COMPANY - MINSTER, OHIO

MINSTER

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Save \$ \$ \$ \$

ATLAS UNIVERSAL JOINTS

Balanced to operate without vibration at all speeds. Short, stubby jaws give maximum resistance to spread. Larger diameter joints fitted with big grease reservoir. Standard alloy steel joints in fifteen sizes for all requirements. Also made in Bronze, Monel and other special metals.

Universal Slip Shafts a specialty.

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THE
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607 WINDSOR ST.
HARTFORD 1, CONN.

Circle No. 22 on Reader Service Card

64

PRODUCTS *continued*



revolutions required before control action occurs. Clutch action permits automatic reset. Can be used for a-c or d-c operation, with 11 dial ranges from 0-12 to 240,000 revolutions.

Automatic Timing & Controls, Inc., King of Prussia, Pa.

Circle No. 216 on Reader Service Card

Gear spray lubricant

Open gear spray lubricant is for use on all gears not running in oil. Spray container reduces lubrication time, and there's no drip or cleaning up of excess lubricant. Lubricant is a special-formulated extreme pressure adhesive lubricant. It also can be used for cams, reciprocating actions, lathe beds, monorail tracks, guides, chains, sprockets, and cables.

J. F. Withers Co., Escondido, Calif.

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Rate gyro

Claimed to be the smallest gyro with d-c motor and potentiometer pick-off ever made for high altitude use. Hermetically sealed instrument, mod-



- FURNISHED COMPLETE
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- HEAT-TREATED, CASE OR FLAME-HARDENED

SIMONDS GEAR produces a complete line of industrial cut gears in a full range of sizes from cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite. Also heat-treated, case or flame-hardened carbon or alloy steel. Or, you may have your own gear blanks custom cut to your order. Same quality . . . same prompt service. Send us your requirements for quotation.

ALSO stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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WORMS • WORM GEARS

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POWER TRANSMISSION DESIGN

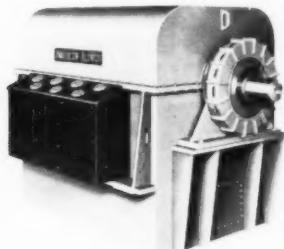
el RG24-0103, is only 1-5/8 in. diameter and 3-1/2 in. long, including the Bendix connector. Motor runs on 28 v, 150 ma maximum running current.

Humphrey, Inc., San Diego, Calif.

Circle No. 218 on Reader Service Card

Fluid drives

A line of adjustable-speed fluid drives was designed specifically for on-the-shaft boiler feed pump drive arrangements, where the boiler feed



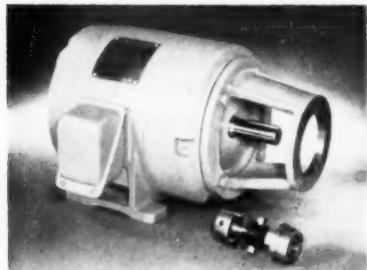
pump is driven directly from the main turbine generator shaft. Standard units, for either 3600 or 1800 rpm input speed, are available for any size boiler feed pump.

American-Standard Industrial Div., Detroit, Mich.

Circle No. 219 on Reader Service Card

Hydraulic pump motor

This hydraulic pump motor has an adapter that allows the hydraulic pump to be motor-mounted. It's



available in NEMA frames through 215, in dripproof, enclosed, or explosion-proof construction. The motor can be supplied with a flexible coupling to assure proper shaft alignment.

General Electric Co., Schenectady, N. Y.

Circle No. 220 on Reader Service Card

Tiny shaft collars

Steel collars for shafts 1/16 in. and 3/32 in. in diameter can be used to take up thrust, for locking, spacing, and positioning shafts, and for other

STANDS TOUGHEST SERVICE DRIVES HEAVIEST LOADS



ATLAS OFFSET SIDE BAR ROLLER CHAIN PRECISION BUILT...HEAVY LOAD CHAIN

PRECISION CLEARANCES for efficient operation . . . accurate fit and smooth bearing surfaces.

PINS TOUGHENED for shock loads. Precision hardened rollers, bushings and links to stand severe operating conditions.

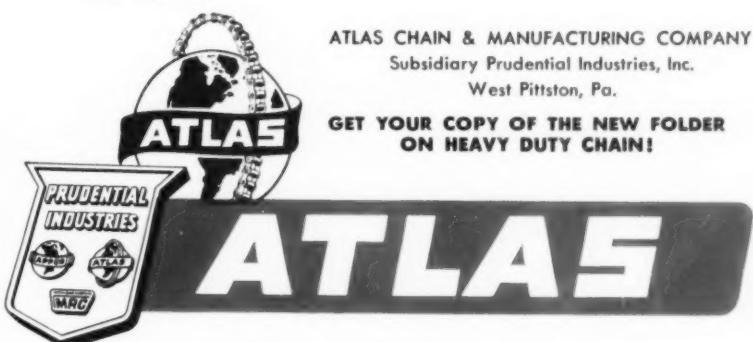
DETACHABLE ASSEMBLY makes link replacement easy. Chain made up of series of identical links held together with cottered or riveted pins. No searching for connecting link.

BUILT-IN MISALIGNMENT COMPENSATION to allow for sprocket variance. Requires same sprockets as for standard roller chain.

This is the chain to handle heavy loads under extremely difficult operating conditions. Made in sizes from No. 3100 single width to No. 3160-2 double width. For complete details and power transmission advice write or call . . .

ATLAS CHAIN & MANUFACTURING COMPANY
Subsidiary Prudential Industries, Inc.
West Pittston, Pa.

**GET YOUR COPY OF THE NEW FOLDER
ON HEAVY DUTY CHAIN!**



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Elliot

FLEXIBLE SHAFTING

for power transmission

WRITE FOR CATALOG 250 TODAY!

IN STANDARD SIZES FROM
 $\frac{1}{4}$ " TO $1\frac{1}{4}$ " WITH NON-RAVEL CORES
Serving the O. E. M. user since 1932

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B. W. Elliott MFG. CO., INC.
 251 State St., Binghamton, N. Y.



PRODUCTS *continued*

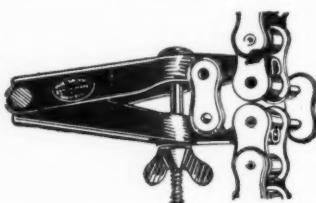
mechanical applications. Collars have hex socket set screws with standard plain cup point. Other points and self-locking feature are optional.

Standard Pressed Steel Co., Jenkintown, Pa.

Circle No. 221 on Reader Service Card

Roller chain puller

Inserted between chain rollers, the Sa-Vu chain puller draws ends of the chain together and holds them in position, leaving hands free to insert the connecting link. It fits all chain



widths, and pitches from $\frac{3}{8}$ to $\frac{3}{4}$ in. It's only $3\frac{3}{4}$ in. long, has hardened steel jaws, and is zinc plated.

General Chain Sales Corp., New York, N. Y.

Circle No. 222 on Reader Service Card

Miniature brake

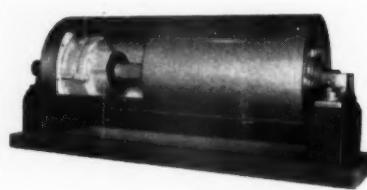
Featuring high torque, small size, low power consumption, and long life, a miniature electro-magnetic wafer brake (frame size 8) has an overall length of .405 in. and an output torque of 16 oz.-in. There are no slip rings, brushes, rotating coils, or other moving electrical parts.

Dynamic Instrument Corp., Westbury, L. I., N. Y.

Circle No. 223 on Reader Service Card

Conveyor drive

Company has developed a new, more compact unit using the same standard gearing as in its line of planetary gear reducers. 1 to 10 hp range, with 30 different ratios from $2\frac{1}{2}$



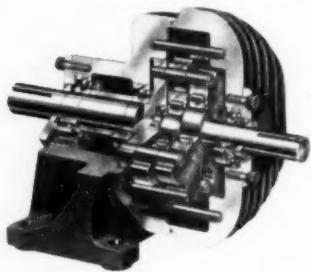
to 1 up to 215 to 1. Reducer is completely enclosed in a dirt-free drum, 12 in. diameter and up.

Crichton Co., Johnstown, Pa.

Circle No. 224 on Reader Service Card

Cycloid-type reducer

Compact reduction drive based on the cycloid principle is said to run virtually without noise in an oil-sealed cast iron housing, with a num-



ber of teeth carrying the load at all times for minimum wear.

Black Tool, Inc., Denver, Colo.

Circle No. 225 on Reader Service Card

CLASSIFIED ADS

Rates: for "Positions Wanted" \$8.00 minimum, limit 25 words. For all other classifications \$10.00 minimum for 25 words; each additional word 25c. Bold-face type or all caps, \$12.00 minimum for 25 words, each additional word 35c. Box address counts as five words. All insertions payable in advance.

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ADDITIONAL CLUTCH LINES wanted by Manufacturers' Representative covering North California. Graduate mechanical engineer. Specialize in clutches and power transmission equipment. Reply Box 2160, Power Transmission Design.

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We can offer an excellent opportunity for advancement to an outstanding Mechanical Engineer in design and development of flexible couplings and other mechanical power transmission equipment. We want a man who has initiative, ideas and experience in this field.

Please write listing experience, and present salary to:

A. W. Pomper, Director of Engineering

WALDRON-HARTIG

DIVISION OF MIDLAND-ROSS CORP.
 P.O. Box 791 New Brunswick, N. J.

Circle No. 26 on Reader Service Card

**5
Reasons Why
Veelos
Adjustable V-Belts
Are Better
for Your Drives**

1. *Balanced Construction* assures faster, cleaner work. Each link and stud is identical in size and weight; no spots of varying density.

2. *Less Vibration*—up to 90% less—in machines with Veelos-equipped drives. Wear on bearings and machines is greatly reduced.

3. *Cooler Running* assures long life. Constant circulation of air around and between Veelos links prevents internal heat build-up.

4. *Greater Flexibility* reduces slippage. Each link moves around sheave independently, maintains full contact; permits shorter centers, smaller sheaves.

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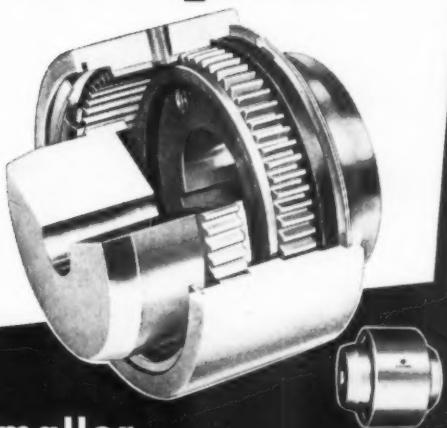
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are
**smaller
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WHAT'S YOUR PROBLEM?

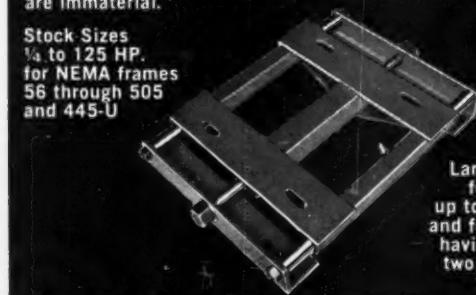
Is it any of the following?

- Diminishing output due to a progressive drop in rpm.
- Too much down-time because of the need for frequent adjustment due to belt stretch.
- Excessive maintenance time and expense.
- Poor belt and bearing life.
- A drive in an inaccessible or isolated location.
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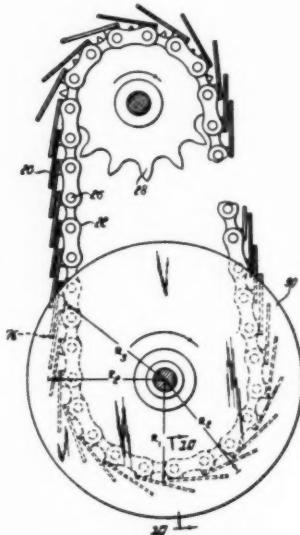
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PATENTS

Variable-speed drive

U.S. Patent No. 2,897,682; Edmund C. Johnson, Granville, Ohio.

Drive consists of chain, sprocket, and a variable-pitch sheave. The chain drives the sheave through key-

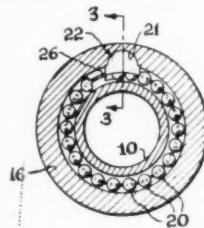


stone shaped members attached at one end to the chain. Small ends of these members are attached to the chain; large ends are free. Speed is varied by varying diameter of the sheave.

Ball bearing screw and nut

U.S. Patent No. 2,895,313; Harry Orner, Altadena, Calif.

Helical ball race grooves in screw and nut form a working ball race of substantially a single convolution. A single convoluted passage in the nut forms a

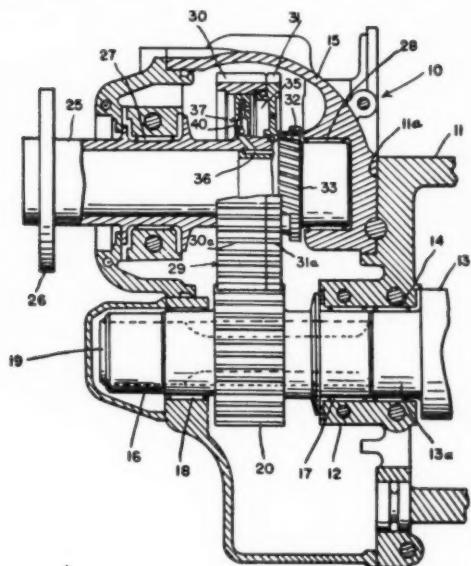


return ball race loop. The passage has substantially the same pitch as the ball race loop but pitch is reversed to return balls from the end to the beginning of the working loop. A continuous ball race with figure eight configuration is formed. Return loop is in the same general plane transversely of the screw as the working loop and has no abrupt changes in direction.

Anti-backlash device

U.S. Patent No. 2,896,466; William Wiseman, Muskegon, Mich., assignor to Continental Motors Corp.

Driven gear on the propeller shaft of an aircraft engine consists of two portions which may be shifted angularly with respect to each other and thus eliminate all backlash between the driving gear and driven gear.

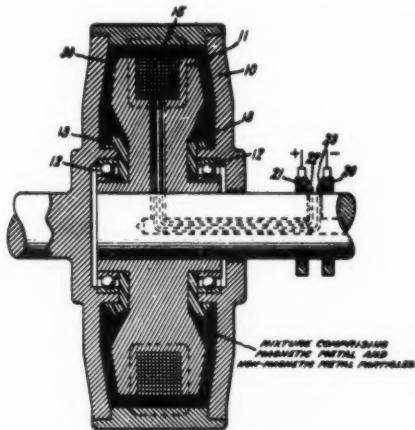


Control means is operable only at preselected speeds. Axial movement of one gear portion on the helical splines of the prop shaft changes the angular relationship of the two portions of the gear.

Magnetic powder clutch

U.S. Patent No. 2,897,931; Fritz Didszuns, Schenectady, N. Y., assignor to General Electric Co.

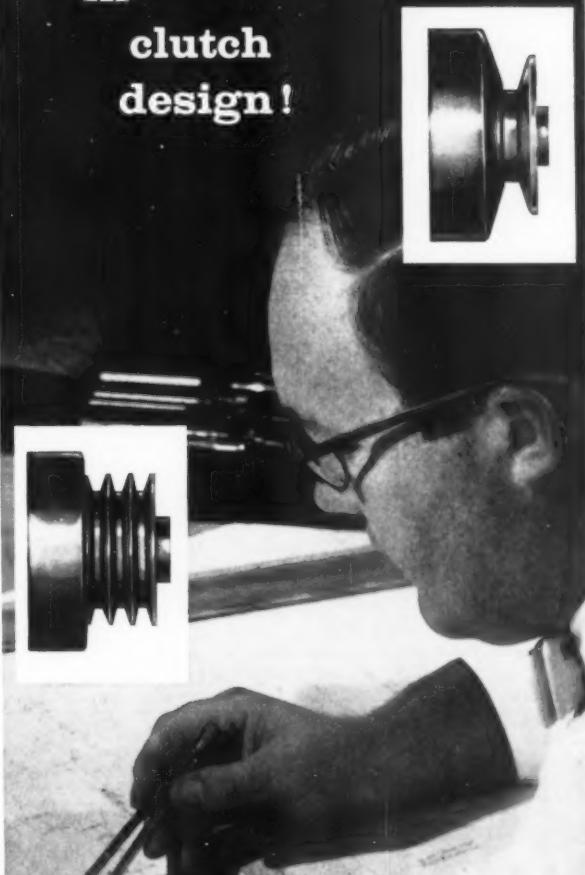
A pair of relatively movable members have an air gap between them. The air gap is filled with a resilient



metal powder consisting of approximately 83% magnetic powder and 12% titanium sponge. Clutch is engaged by creating a magnetic field across the air gap.

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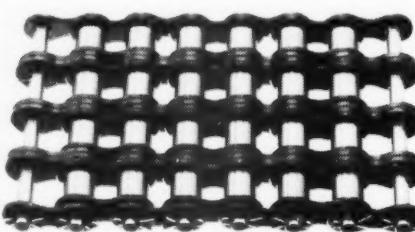
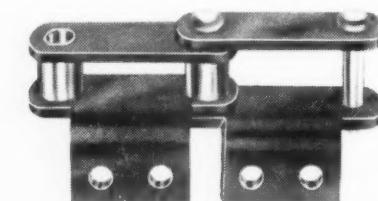
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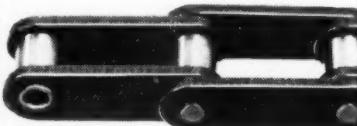
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Maxitorq

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floating disc

single and double clutches or brakes

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The Maxitorq Clutch is completely assembled on the clutch body and shipped ready to slip onto a shaft. Separator springs... an outstanding feature... assure the advantages of truly floating discs. Used between each pair of inner discs, they spread them endways with an accordian action so that light can be seen between all discs when the clutch is in neutral. The floating disc feature makes certain that there's no drag... no abrasion... and consequently no heat when the clutch is in neutral.

A locking plate on the disc end of each clutch (two on the double types) locks all discs against tension developed by the separator springs. Manual adjustment is made by raising the lock spring, then turning the adjusting ring to give the desired shifting pressure.

Note that assembly adjustment and take-apart are all manual... no tools required.

Standard Maxitorq Clutches are available in single and double types, wet or dry... also in pulley and cut-off coupling types. Capacities to 15 h.p. at 100 r.p.m. Write Dept. PT for bulletin today.



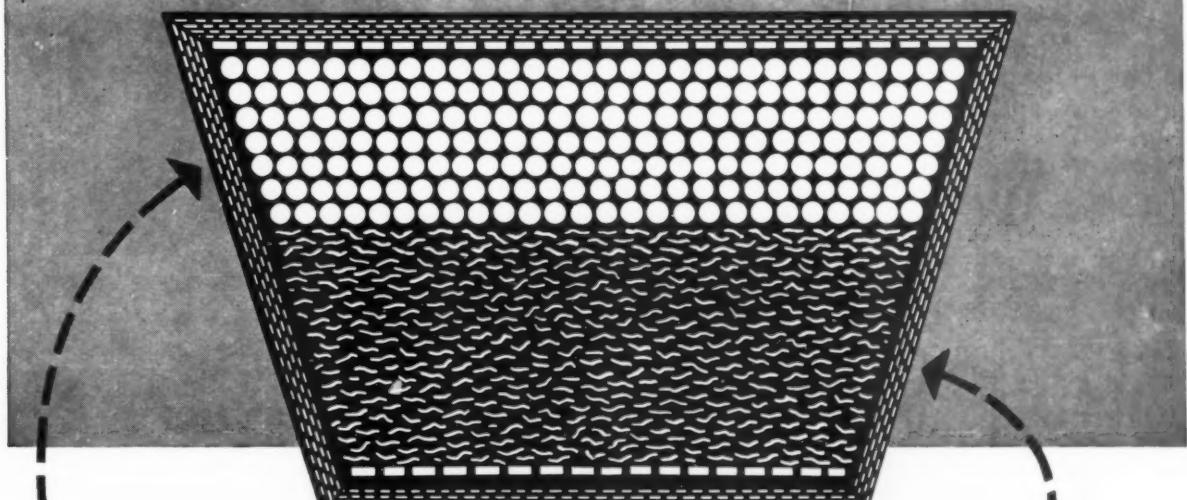
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are made with...

BOSTRON Tensile Members

PLUS

**NEOPRENE with
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EXTRA SUPPORT for the tensile members during shock-load impact and during normal operation.

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- MAINTAIN SMALLER INVENTORY
- SAVE MATCHING TIME
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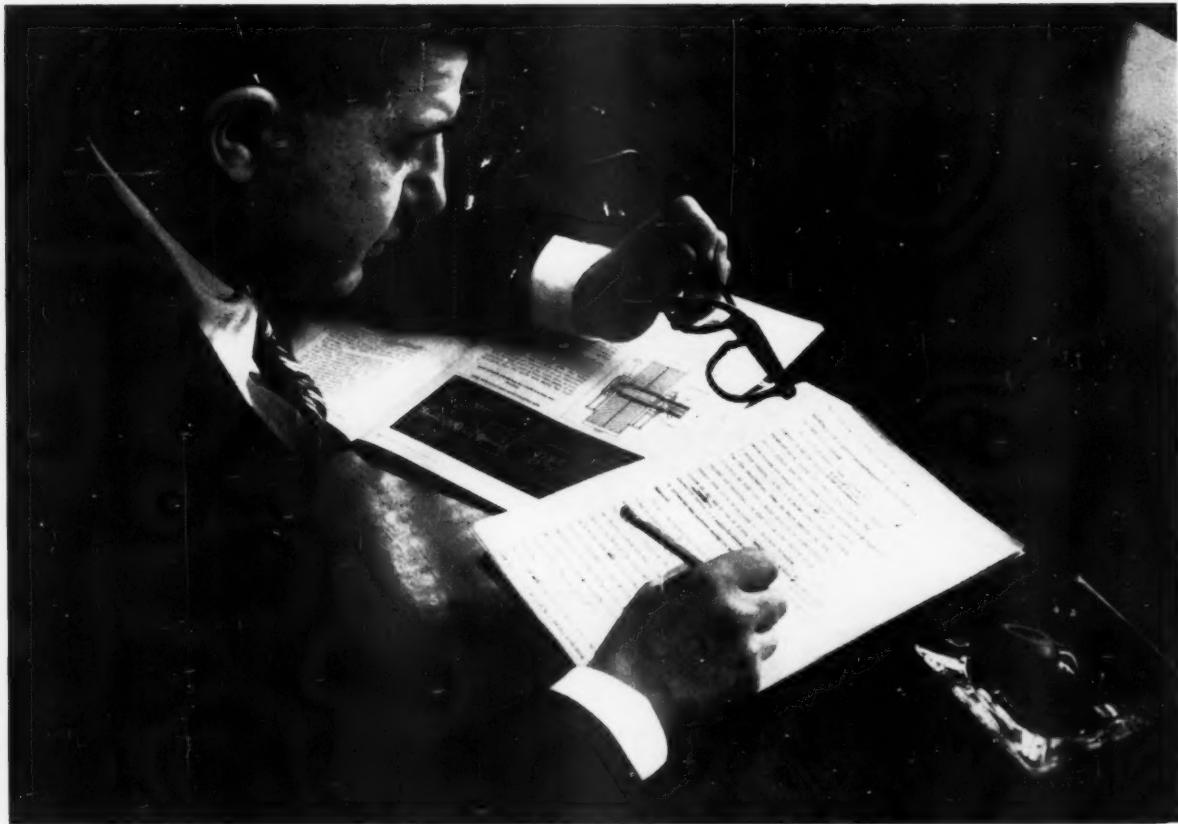


MATTING



TAPE

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